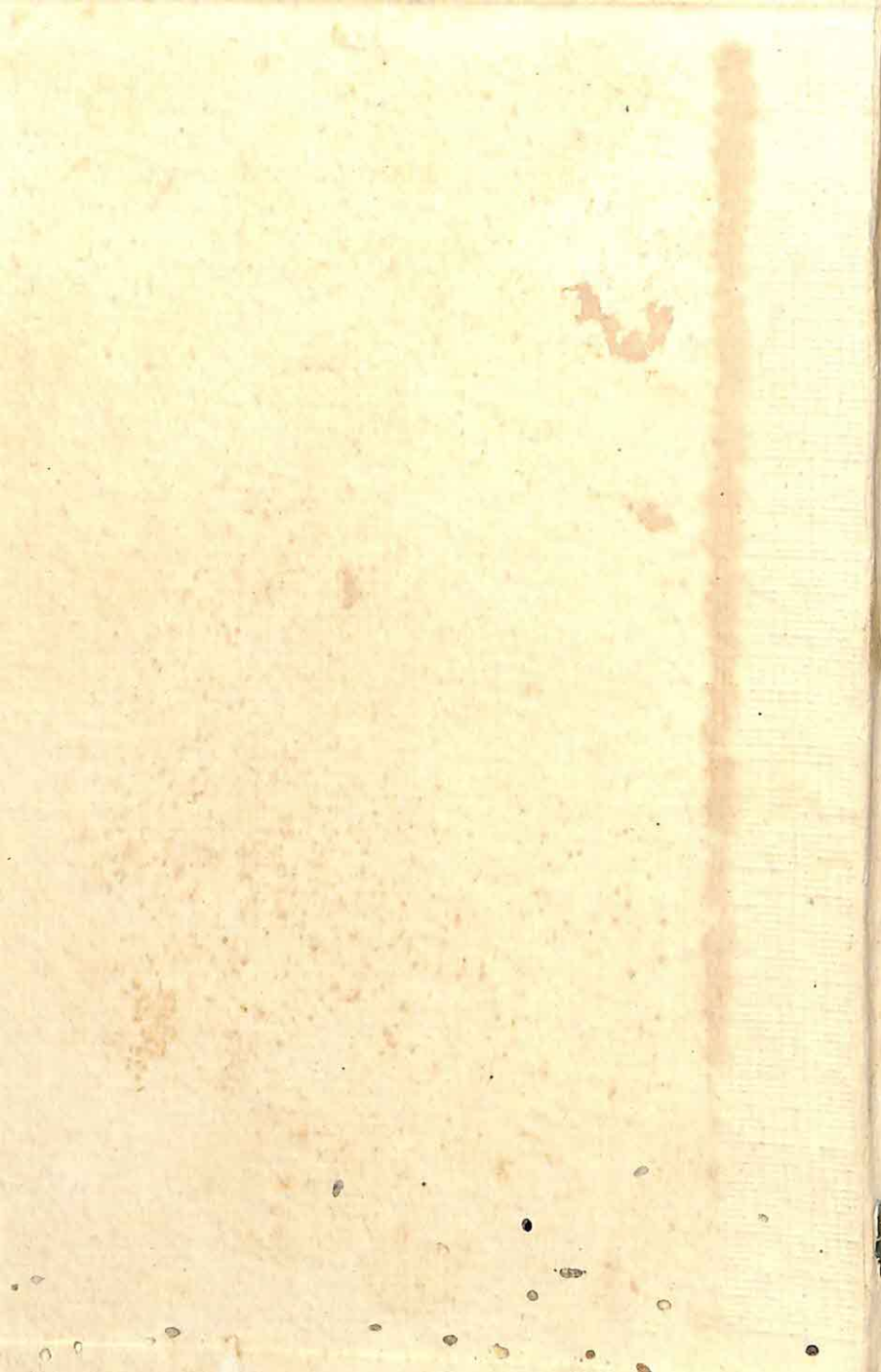


KENNETH WALKER

THE HEALING ARTS

A layman's guide to present
and probable future trends
in the Healing Arts and
their influence on everyday
life.

The Changing World Series



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THE HEALING ARTS



The Changing World Series

THE
HEALING ARTS
AND THEIR FUTURE

by
KENNETH WALKER

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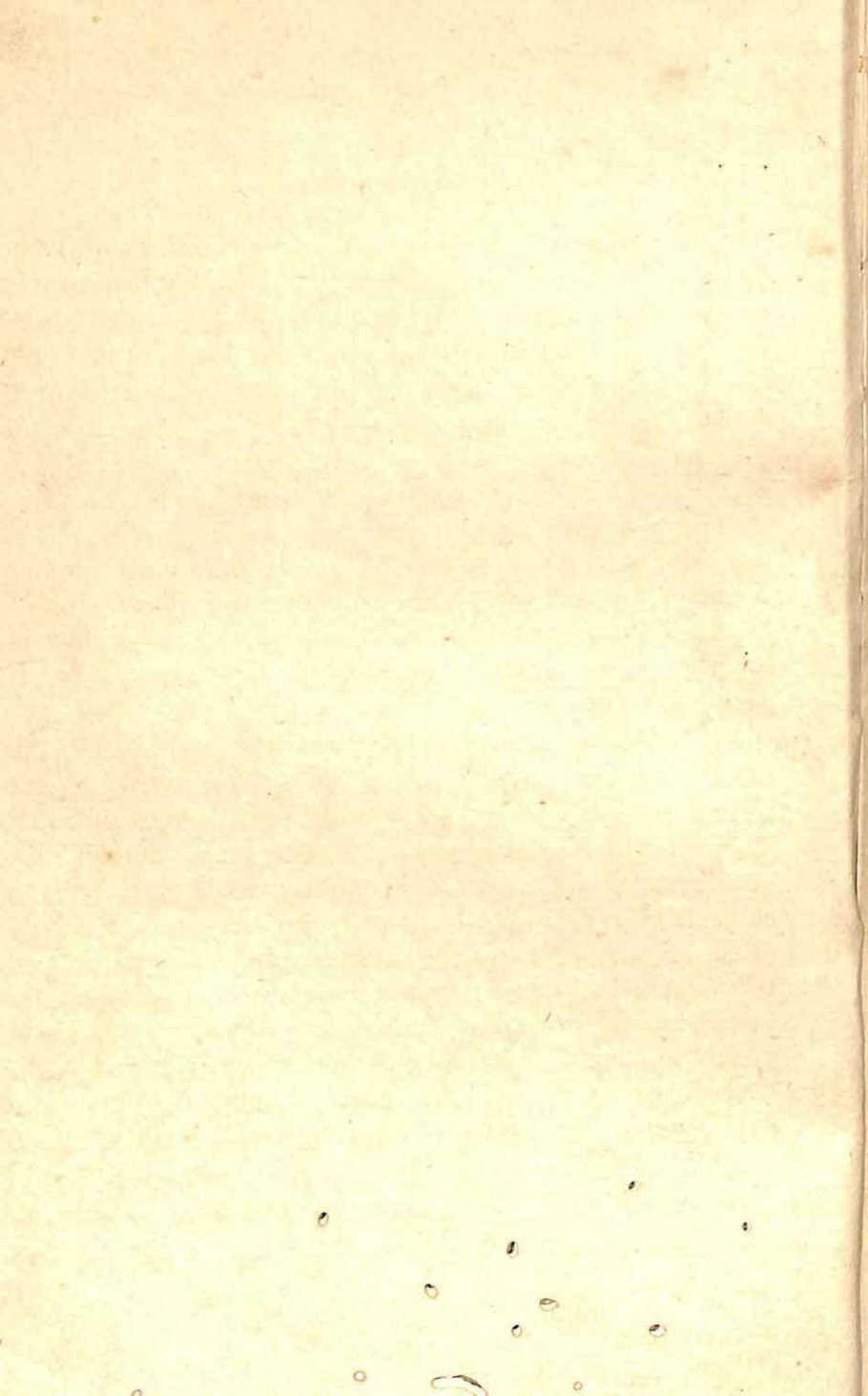
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PREFACE

THE inspired prophet is so unpopular with his fellow men that he runs a grave risk of being stoned by them, but the fact that the forecasts in this book are based, not on prophetic inspiration, but on a pedestrian study of present trends, should protect me from this fate. I even cherish a hope that in the years to come my prognostications concerning the profession of medicine will be proved to be wrong. This is quite likely to be the case, for the future can rarely be guessed by extending the lines along which present events are moving. What makes this method of prophecy unreliable is that no human activity continues for very long in the same direction. The course of human history resembles an irregular spiral rather than a straight line, the future being rarely what we expect it to be, the present raised to the n th degree.

My task is to consider present, and to attempt to foretell, future trends in medicine and in the medical profession, but neither of these subjects can be studied in a state of isolation. They must be viewed against the shifting background of such great events as the state of the world to-day and in the years to come. It may be thought by some of my readers that I am unduly pessimistic about the future of my calling and it is true I am glad that I am ending rather than beginning my medical career, for I do not like the direction in which the medical profession is at present moving. Is this distaste of mine to be explained by the well-known fondness of the elderly man for the "good old days" and by his inability to accept the new? I would like to think that this is the explanation of my pessimism, for I have a high opinion of my profession and would have preferred to have foretold a brighter future for it.

This book may be read by some of my colleagues, but it has been written for the lay reader rather than for the medical man. Not that this has necessitated any great alteration in the manner of writing it. It is a common medical error to under-rate the capacity of the layman to understand the so-called mysteries of the doctor's art. Medicine is based on common sense, and I have been surprised how readily my patients grasp its principles and how quickly they see the rationale of the treatment prescribed for them. All that it is necessary to do in order to gain their co-operation and their interest is to avoid the technicalities of the medical text-book and to speak in the simpler language of everyday life. This is the principle on which I have acted in my consulting-room and it is the one which has guided me in writing this book.

It is customary for an author to make acknowledgements in his preface to the various authorities he has quoted in his text, but it is a custom I find it now difficult to follow. The reason for this is the simple one that no medical man appears to have written a book on the future of medicine, and consequently there is no one to whom my acknowledgements are owing. I can only conclude from my inability to find any guidance from the work of others that my colleagues are much wiser than myself. Knowing, as they do, the errors we doctors make in prognosticating the course of a single disease, they are not so foolish as to attempt to foretell the future of all diseases and of all methods of treatment. I acknowledge therefore their wisdom even if there be no call for me to acknowledge their books. The works which have been of help in writing of the past and the present of the healing arts have been acknowledged in the text.

LONDON, W.I.

Chapter I

HEALTH

A MAN would be rash to predict the world's history during the next twenty years, and if he were to attempt to look further ahead his foolhardiness would be correspondingly increased. It is a delusion to imagine we can predict the future merely by tracing forward present trends; humanity seldom moves for long in a straight line. Action provokes reaction and this in turn leads to action. So also do new and unforeseeable factors lurk in the future ready to upset the prophet's calculations. Yet, rash though it be, I am proposing first to consider the present relationship of medicine and the medical profession to society and then to foretell the course likely to be taken in the future by that ancient art. The second aim is an ambitious one. It involves asking a number of questions—this is easy—and then finding answers to them: and this is exceedingly difficult. Will private doctors manage to survive or will they all be eventually drawn into the machinery of the State? What sort of remedies will the doctors of the future use? What advances will be made in the various branches of medicine during the next fifty to a hundred years? Will the diseases that the doctors of the future treat be the same as those of to-day, or will new forms of illness have arisen by then? How will the medical profession be organized and will the general level of health of the inhabitants of this country be better or worse than it is to-day? These are the kind of questions that will be asked. What adds to the difficulty of this self-appointed task of prophecy is the fact that medicine in this

country is at the moment in a state of rapid transition from one state to another. Never before have doctors looked with greater anxiety into the future or had more doubts about the effect that recent legislation will have on their profession. Will the new Health Act destroy for good the unique relationship which formerly existed between a patient and his doctor, or is the disorder which at present reigns in the medical profession of a temporary nature? The doctor is disturbed by many questions for which he is unable to find answers.

Whilst it is true that a prediction of the future cannot be based only on present trends much can be learnt from a review of medicine at the present day and even from an occasional backward glance at its past. This is desirable for yet another reason. It will enable the reader to gain a clearer idea of the methodology of medicine and to understand better what doctors are trying to do and what steps they take to restore their patients to health. This will give readers a better appreciation of the problems with which the doctors of the future are likely to be faced and of the new methods that they may employ in dealing with them.

It may be said that doctors have two aims: the first to safeguard their patients from disease and the second to assist them to recover their health as quickly as possible if they should already be ill. These two aims are summed up in the two terms "preventive" and "curative" medicine. Before discussing these two aspects of medical practice, it is necessary to go back further still and to define first what we mean by the words "health" and "disease." We are continually using them, but when we pause for a minute or two and try to formulate what is signified by them, we find this exceedingly difficult to do. It is not only a difficult task for the layman, but also for the doctor—so difficult indeed that no entirely satisfactory

definitions of the terms "health" and "disease" have yet been given.

What is health?

A few years ago a representative body of medical men assembled in a room to find an acceptable definition of the word "health." After much discussion, they reached the conclusion that health was "a state of complete physical, mental and social well-being, and not merely an absence of disease and infirmity." Let us examine this definition and see whether it is a satisfactory one or not. The first question one is prompted to ask is: "Who is to be the judge of this state of well-being?" Can a man be trusted to give a report on his own well-being, or is it essential that the report should be issued by his medical adviser? It is doubtful whether the man himself is to be trusted. There are illnesses in which a patient may feel remarkably well and yet be suffering from some very serious disease, such as generalized peritonitis, and be as intoxicated by the poisons liberated by the micro-organisms responsible for his illness as another man is intoxicated with alcohol. Bright-eyed, with flushed face and in a highly excitable and talkative state, the patient sits up in bed and declares how well he feels, and yet within a few hours he may be dead. This condition of spurious well-being is known to doctors as "euphoria," and it is an exceedingly unfavourable sign in disease. So also may an alcoholic or a drug-taker certify that all is well with him whilst he happens to be under the euphoric influence of his brandy or his morphia. Yet next morning he will issue an entirely different report on his health.

If it is unwise to rely on a man's opinion about his physical health, his report on his psychological and social state is still less trustworthy. The neurotic patient is particularly likely to

be biased on this subject, since a neurotic is inclined to attribute his troubles to his fellow men rather than to himself. "If only people would not worry me so, I would be well," is his attitude. Hamlet voiced the outlook of the neurotic when he exclaimed: "The world is out of joint, O cursed spite that ever I was born to set it right!" Shakespeare created in the Prince of Denmark a typical neurotic, a man who could never make up his mind, who dwelt in the past and who was unreliable, fearful and for ever postponing what he believed to be his sacred mission. No, a man is but a poor judge of his own psychological state. He cannot be trusted to report on his psychological well-being. And what does this representative body of medical men mean by the term "social well-being"? The writer of this book is under the impression that he is at present enjoying physical and psychological health, but he would be diffident about giving any account of his social well-being. He has a small number of friends and a large number of acquaintances, but whether this is an indication that he is socially fit or not, he is unable to say. The representative body of medical men cannot be said to have arrived at a satisfactory definition of health.

The Peckham Health Centre

If further proof is needed of the inability of anyone to judge whether he is healthy or not, it is provided by what can be called the Peckham House Experiment. This Health Centre was opened at Peckham in 1935 and a number of families were invited to take up their residence there, complete families alone being eligible as tenants. Individual men and women were not wanted because the aim of the Centre was to make a special study of the health of that fundamental unit of society, the family. It was believed that valuable information about

health and disease would be obtained if men and women were studied while living under the ordinary conditions of family life in a typical London parish. One thing only was exacted of prospective residents—namely, that they would be willing to submit to routine medical inspections, usually made at monthly intervals. The inhabitants of Peckham were inclined at first to be suspicious of the fine new building that had just been opened, an immense edifice with many windows and glass partitions. But residence there had obvious advantages. The rooms were good, their rents low, and there were social clubs and even a swimming-bath. Slowly, families began to move into the new building and in time all its available accommodation was taken. A monthly medical overhaul was after all only a small payment for the many advantages the management offered its residents.

The routine medical examination revealed a startling state of affairs. It was found that 83 per cent. of the residents were suffering from some form of illness in spite of the fact that they believed themselves to be well. This discovery is still more remarkable when it is remembered that those who moved into the Centre had taken up residence there not because they felt any need for medical advice, but solely because they liked the accommodation offered them. Yet eight out of ten of the new tenants were actually in need of medical treatment! This does not mean that any of them were seriously ill. It means only that their level of health was lower than it should have been, and that as a consequence of this they lived less efficiently than they would otherwise have done. But why, it may be asked, were these people unaware of the fact that they were suffering from some form of illness? It can be explained by the body's astonishing capacity to mask its own defects by means of what is called "compensation."

The compensatory mechanisms of the body

Everybody knows that when a man has the misfortune to lose a leg, the leg on the opposite side becomes far stronger in order to cope with the additional work thrust on it. What is less widely known is that internal organs display a similar capacity to adjust themselves to additional work thrown on them by the indisposition of some other organ. For example, a healthy kidney will manage to carry out the duties formerly performed by two kidneys wherever the necessity arises for its doing so. A heart beats more forcibly to compensate for a back-flow of blood brought about by the inefficiency of some of its valves and in order that it may be able to cope with this extra work its muscular walls thicken.

There is yet another means by which the body adjusts itself to the burden of illness—namely, by insisting on a reduction of the work that it is called upon to do. Let us suppose that a patient with valvular disease manages, thanks to the compensatory thickening of the walls of his heart, to carry on his work as clerk in an office for a number of years. He does this so successfully that he is quite unaware of the fact that he is suffering from cardiac trouble. He may even manage to lead an active life, to work hard at his job, to play games during the week-ends and to live as strenuously as do his fellow men. But he succeeds in doing all this only for a limited number of years. The day eventually arrives when he begins to feel the strain of living such an active life and, after thinking the matter over carefully, he decides that his hockey game on Saturdays must be given up. He retires from the club, and with immediate benefit to himself. He no longer feels tired on Monday morning, as he formerly did, and because the strain on his heart has been reduced, his health becomes better

for a year or two. Then the old tiredness returns and he decides that instead of walking, as was his custom, to and from the station, he will in future take the bus. Again with the lightening of work dictated to him by his own body he notes an improvement in general health. At the end of another year or two his body calls again for yet another reduction of its load. He comes to the conclusion that the heavier work he is doing in the garden, such as rolling the lawn, is too much for him; henceforth he will do only the lighter gardening jobs. Next comes the abandonment of all social engagements in the evenings. One by one all non-essential activities are given up and by making these repeated sacrifices he manages still to carry on his work at the office. Living carefully in this way, he may eventually die without it ever being known that he suffered from heart disease. Or his condition may rapidly grow worse, his heart suddenly dilate and a doctor be summoned. Then only may the true explanation of his previous "tiredness" become plain to him.

Health a positive condition

Health cannot be defined in purely negative terms as an absence of disease. It is a positive condition which is worthy of much more study than it has yet hitherto been given. The truth is that the medical profession has been so occupied with the investigation and treatment of disease that it has been able to spare but little time for the study of health. As a result of this, doctors often know less about it than do such non-medical experts as trainers, rowing coaches, athletes and naval and military instructors in physical sports and exercises. It is to be hoped that some day a greater number of medical men will be freed from the treatment of disease so that they may be able to devote themselves to the study of the positive condition

we call "health." Health confers on its possessor the ability to live fully and with enjoyment the normal life of a man. But even this seemingly simple statement evokes a further question. What should we consider to be the normal life of a man or woman? Can we include under this heading the life of a pugilist, of a deep-sea diver, or of a member of a Mount Everest expedition? Surely the answer to this question must be in the negative. All of these people are subjecting themselves to strains that the human body was not designed to take. Great though the ability of a living organism is to adapt itself to changes in its environment, there must necessarily be a limit to what is demanded of it, and men who overstep this boundary cannot expect to remain healthy. The body can only be expected to be adaptable to a certain range of changes.

Adaptability as a measure of health

Medical men make use of the yardstick of adaptability in estimating the efficiency of an organ. For example, the efficiency of the heart can be estimated by noting its response to the calls made upon it for an increase of work. When anyone runs upstairs his heart must beat more frequently and more forcibly in order that it may propel a greater quantity of blood through the muscles and the lungs. When this special call on its powers has ended it resumes its normal beat. The more healthy the heart the more promptly does it respond to the body's increased demands and the more quickly does it recover its normal rhythm when these have been satisfied. The medical man is therefore able to obtain a rough measurement of his patient's cardiac health by noting the frequency of the pulse and the state of the blood-pressure before and after exertion. So also can a doctor test the efficiency and health of

his patients' kidneys by observing the promptness with which they excrete urine after the intake of a large quantity of fluid. The kidneys are responsible for the maintenance of the water-content of the blood at a constant level and if it were not for their success in doing this our blood would be diluted after every copious drink. The doctor therefore watches the quickness and efficiency with which they carry out this duty and in this way measures their health. During the late war considerable use was made of similar methods of measuring a soldier's ability, as a whole organism, to adjust himself to abrupt changes in his environment. One of the problems submitted to the scientific committee on which the writer happened to serve was the problem of sea-sickness. It was obviously wasteful to dispatch men on seafaring raids if on their arrival at their destination they were completely incapacitated by sea-sickness. Something, of course, could be done to reduce the incidence of this minor form of illness by giving those who were bad sailors a sedative drug, but such a form of treatment was very unreliable. A better solution of the problem was to eliminate beforehand all those who would be likely to arrive at their destination indisposed. By submitting men to tests on swings, round-about and other nausea-producing contrivances, it was possible to separate those who would be likely to adjust themselves promptly to the movement of a ship on a rough sea from those who had little ability to do this. It was also found that practice on these mechanical contrivances assisted those who had at first adjusted themselves poorly to them to become more proficient. By conditioning, they became good sailors—in other words, they managed to retain their "health." So one possible definition of health is "the ability to retain an inner state of harmony and to make quick adjustments to external changes in the environment."

Age in relation to health

If health is to be measured by adaptability it would be absurd to submit men of widely different ages to the same test. The young ski-er is capable of making prodigious ski-ing adjustments, to glide into the air and to retain his balance on making contact with the ground again whilst travelling at a great speed, and he is able to do all this without damaging his body. The strain on the body and on the mind of an expert in ski-jumping is an immense one, and after reaching the thirties the majority of ski-ers cease to take part in competitions. The same is true to a lesser degree of Rugby football players, but no one would think of calling retired ski-jumpers and Rugby footballers unfit merely on the grounds that they were unable any longer to adjust themselves to the environment of the ski-jumps or the Rugby football ground. If such men as these are to be labelled unhealthy, then all men over the age of twenty-five must be considered unhealthy, for it is in the early twenties that the human body is at its zenith, and subsequently its efficiency declines. Age must therefore be taken into account when estimating an individual's ability to adapt himself to difficult conditions.

There are other factors to be considered in estimating health in terms of adaptability. Man has not only a body, but also a mind, and although the body has begun to decline in the later twenties, his mind has not yet reached its zenith at that age. Man's spiritual maturity,—if we are willing to accord him a spirit as well as a mind,—may not be attained till much later, perhaps not until the mind has also passed its prime. When speaking of health, therefore, it is necessary to be explicit and to state what sort of health is being considered. Is it the health of the body on which emphasis is being laid, or is it the health

of the mind or the spirit? Man is an indivisible whole, a whole that is more than the sum-total of its parts, and it is to the complete man that the word "health" should be applied. Health should mean a right working of all our functions and the maintenance of a right balance or harmony between them. This is unfortunately a level of health to which few of us are able to aspire, so our standard of health must be lowered. For the limited purposes of this book, it will be regarded as being a state of inner harmony, associated with the ability to make prompt and successful adjustments to changes in environment.

Chapter II

DISEASE

DISEASE is what the word implies, an absence of ease due to a state of inner disorder. Disease is a less difficult term to define than was health and we can pass therefore straight to a discussion of its nature and of its various causes. The significance and the explanations of disease have varied at different periods of human history. In ancient times when people believed that the world and their lives were ruled by both benevolent and hostile spirits it was natural that they should attribute the body's illnesses to its possession by a demon. If a man fell ill he promptly summoned a witch doctor or a priest to expel the evil spirit that had taken possession of him, or, if these were not available, he cured himself by magical rites and incantations. The demoniac theory of illness was popular in Palestine at the time of Christ's mission to mankind. But the writers of the Gospels did not account for all forms of disease in this way, for amongst the illnesses that the Messiah cured were cases of leprosy, fever palsy and an issue of blood. It was only in certain cases of an epileptic nature that Christ is said to have spoken of possession by a demon.

The Greek view of disease

The earlier Greeks believed that illness was a punishment meted out to men by the gods, and one of the great debts that modern medicine owes to Hippocrates is that he freed men from this superstition. He taught them that illness was a natural phenomenon which should be studied in the same way that all

other natural phenomena were studied. He advised the doctor-philosophers of his day to observe carefully the onset of diseases and their course and, whenever this was possible, to discover their cause. The clinical notes on diseases compiled by Hippocrates are so excellent that some of his descriptions are used by doctors at the present day. Every medical student is familiar with his graphic account of the pinched and pallid face of a patient suffering from peritonitis, and his description is so good that the term "Facies Hippocratica" is to be found in all modern medical text-books. Because Hippocrates taught men this clinical approach to disease he is rightly looked upon as being the father of modern medicine.

Another boon he conferred on the art of healing was that he freed it from the study of philosophy with which it had previously been coupled. In ancient Greece many of the philosophers were also doctors, but Hippocrates was astute enough to realize that if medicine were to make progress it must be independent of all philosophical speculations. It must be based on the clinical observations made by doctors and not on the authority of such great philosophical names as Democritus and Empedocles. So medicine was freed from philosophical entanglements and, becoming independent, it made great progress during the following centuries.

The rise of modern medicine

Human activities never continue for long to move in a straight line and in the second century after the birth of Christ a great and learned physician appeared who left behind him a number of long Latin treatises on medicine. These writings of Galen gained such an immense reputation that medical men ceased to read the book of nature and, instead of studying their patients, consulted the master works of the great physician

Galen. Authority re-established its hold on medicine and for a long time the latter ceased to make any further progress. A second act of liberation became necessary and this was carried out for medicine in this country by Sydenham, the contemporary of Harvey, the discoverer of the circulation of the blood. The advice which the new liberator gave to his colleagues was very similar to that previously given by Hippocrates, as Sydenham himself realized. "In writing therefore such a natural history of medicine, every philosophical hypothesis must be set aside, and the patient manifest and natural phenomena, however minute, should be noted with the utmost exactness. The usefulness of this procedure cannot be easily over-estimated as compared with the subtle inquiries and trifling notions of modern writers. . . . By these steps and helps it was that the Father of Physics, the great Hippocrates, came to excel, his theory being no more than an exact description or view of Nature. He found that nature alone often terminates diseases, and worked with a few simple medicines, and often enough with no medicines at all." Since that time medicine has regained its independence of all allied studies other than that of science, with which it has now established a close alliance. Diseases are investigated in precisely the same way that other natural phenomena are investigated, by exact observation supplemented by the scientific or experimental method of investigation. The methods employed by medicine are now so firmly established that it is unlikely in the extreme that any third act of liberation will ever be needed.

The nature of disease

The partnership between medicine and science has long been such a close one that the medical view of disease at any time

of history reflects the scientific theories of the day. In the eighteenth and nineteenth centuries scientists were of the opinion that everything in the universe from the atom to the Milky Way could be satisfactorily explained in terms of mechanism and the contemporary doctors proceeded to explain disease in a similar way. For them, a human being was a highly complicated piece of machinery and a sick human being was a badly running or broken piece of machinery. When a man fell ill it was because something had gone wrong with his mechanism and the duty of the doctor was to discover the nature of the mechanical defect he had developed and to do his best to repair it. This was no easy task, for unlike other mechanics, the doctor is unable to replace old and hopelessly damaged human structures with spare parts. Anatomy and pathology both lent support to this entirely mechanical view of life and illness. A man with a weak heart was ill because his cardiac valves had been so badly strained and damaged that they were no longer able to prevent a reflux of the blood. A patient who suffered from jaundice suffered from it because a gall-stone had blocked the hepatic duct of the liver and thus prevented the onward passage of the bile into the duodenum. A bronchitic patient's lips were blue and he was breathless whenever he walked uphill because his blood was insufficiently aerated by his inefficiently working lungs. In short, a sick man was a defective broken engine in need of repair.

The bacterial origin of illness

In the nineteenth century new light was thrown on disease by the brilliant discoveries of Pasteur, discoveries which accounted for many kinds of illness but not necessarily for all. Having proved that bacteria were responsible for the conversion of wine into vinegar, Pasteur extended the field of his

investigations and also demonstrated that they explained certain forms of illness. His work on bacteria was of immense importance to mankind and it had far-reaching consequences for medicine and for the machine view of illness. Henceforth a sick man was no longer looked upon merely as a machine that was suffering from the wear and tear of living, but was regarded rather as a machine that was being sabotaged by hostile forms of life. Pasteur not only diverted medical thought in a new direction but he gave doctors valuable aid in diagnosis. He also introduced an entirely new method of treatment. Hostile germs could be dealt with in several ways. They could be killed with disinfectants and by heat, and Pasteur showed that they could also be overcome by raising a patient's resistance to them. This increased resistance was conferred on a man by inoculating him with germs of diminished virulence and by means of this new inoculation method Pasteur succeeded in preventing the development of rabies, a disease which had previously claimed many victims.

As the result of Pasteur's pioneer work a new kind of specialist appeared on the scene, the bacteriologist. With his help the medical profession set out to discover and to make war on all forms of germs that were hostile to human life. The news of Pasteur's great discoveries rapidly spread and stimulated work in neighbouring countries. In Great Britain Lister began using carbolic sprays in surgery in the hope that it would combat sepsis. This innovation of his proved so successful that post-operative suppuration, which had hitherto been the almost inevitable sequel to an operation, was almost banished from Lister's hospital wards. The germ theory of disease was firmly established and within twenty years bacteriological departments were to be found in all of the larger hospitals. Bacteriological research is of such importance to

medicine and it is likely to have so much bearing on its future that it will have to be discussed more fully.

The world of micro-organisms

Plants have the power to build up simple chemicals into the complex molecules which form their tissues. With the help of energy from the sun, their green colouring matter, chlorophyll, is able to combine carbon dioxide, oxygen and water so as to form sugar, starch and cellulose. Whilst the plants' leaves are carrying out this important synthesis above ground their roots are soaking up the nitrates of the soil and are supplying the plants' other needs. Because animals are unable to achieve this work of building up simple molecules into complex ones, they are entirely dependent for their food on other forms of life, either animal or vegetable. To eat life and in turn be eaten by life is the law under which all animals, including man, are fated to live and none of us can evade it. An unsteady balance is maintained between the various forms of life existing on the surface of this planet, a balance which is periodically disturbed but which quickly re-establishes itself. It is the duty of the ecologists to study the working of this balance. When for one reason or another some form of life gains a temporary ascendancy over a rival form it is for the ecologists to discover why this has happened. In this book we are concerned only with the balance maintained between two competitors in the struggle for survival, namely man and the pathogenic organisms. When looked at from the viewpoint of the epidemiologist an epidemic is not just a meaningless accident. It represents a temporary gain on the part of mankind's tiny but powerful enemies, the disease-carrying organisms. Why has the epidemic occurred? What can be done to hasten the restoration of the balance and to tilt the beam in favour of humanity? These are

the kinds of question for which the epidemiologist tries to find answers. Having vanquished his former enemies, the great carnivora, man now carries on an endless scientific warfare against a far more elusive and powerful foe which compensates for its lack of size by sheer force of numbers. When streptococci multiply in a wound, or the diphtheria bacillus gains a foothold in a patient's throat, the doctor steps in and does his best to dislodge them. He also stops their spread by isolating the victim of their attack and thus preventing the establishment of hostile colonies elsewhere. In other words, he carries on a relentless war of attrition against his foes, destroying them whenever he can and when unable to destroy them, preventing them from gaining new footholds.

But bacteria and their smaller brethren, the viruses, are not the sole cause of diseases. It would be interesting to know the extent to which micro-organisms are responsible for human illness, but no statistics are available for this purpose, the reason being that the cause of many diseases is as yet unknown. For example, it has not yet been decided whether cancer is due to infection with a virus or not. All that we can say with any certainty about this disease is that it is often a sequel of chronic irritation of the tissues. Nor is the presence of a pathogenic organism alone sufficient to produce illness, for we are all equipped with powerful weapons of defence against them. Every day we city-dwellers draw into our lungs tubercle bacilli attached to dust floating in the air and, when we were children, we swallowed great numbers of them in cow's milk. Yet it is only when our resistance has been lowered by other causes that we become vulnerable to the attack of organisms. Moreover, in many illnesses infection by organisms is not primarily responsible for what has happened, but is only a secondary complication of it.

It would be an error to regard all forms of micro-organism as being hostile to us, for many of them are our friends without whose help we would find it difficult, or impossible, to live. If through some world-wide catastrophe all micro-organisms were to be destroyed, life on the earth would come to an end. Without the activity of the nitrifying organisms in the soil the nitrogen cycle, on which the growth of plants depends, would stop. The disappearance of the plants would then be followed by the death of all the animals for they would have been deprived of all their food. Bacteria are therefore sustainers as well as destroyers of human life and since friendly micro-organisms are far more plentiful than are hostile ones, the micro-organisms must be accounted our allies rather than our enemies.

Other non-microbial causes of illness must now be considered.

Deficiency diseases

Many diseases can be placed under this heading of deficiency diseases. They arise either because some substance which is essential to human health is lacking in the diet, or else because it is no longer manufactured in sufficient quantities in the body. Vitamin deficiency is an example of the first type of shortage and hypothyroidism of the second. But when a doctor discovers that there is a lack of thyroid secretion in his patient, his work is not ended for he must try to find out why he happens to be deficient in this particular hormone. Sometimes the explanation is that the patient's thyroid has previously been damaged by infection, and in this case the disease will have to be placed under the former heading of diseases due to micro-organisms. It will be seen therefore that the divisions that are now being made between the various types of disease are not

really fundamental divisions, but only a convenient method of classification.

Diseases characterized by a faulty reaction on the part of the body

The more one sees of the behaviour of the human body, the more one is astonished by its cleverness. So multitudinous are its tasks and so delicately are its numerous functions poised, that it seems a miracle that the body should manage to maintain its inner harmony for so long. The marvel is not that the body is sometimes at fault, but that it manages to sustain so well the jolts and shocks to which all living organisms are continually being subjected. We do not live here on the earth in the carefully regulated environment of hot-house plants, but amidst abrupt and continual changes. Yet by their skilful adjustments to these sudden jolts and jars, our bodies manage to maintain their inner balance and to continue their astonishingly difficult work. This does not necessarily mean that the human body never makes a mistake, for there is a certain group of illnesses characterized by under- or over-reaction on its part. Asthma is a good example of an illness of this sort. An asthmatic attack is caused by an exaggerated and harmful reaction of the bronchial tubes to a comparatively mild form of irritation. It is natural and proper that the muscle fibres surrounding the bronchial tubes should contract on being irritated by dust or pollen, but in the case of an asthmatic this natural response is so excessive that the mildest form of stimulus is capable of provoking it. Bronchial spasm may be brought about not only directly by the inhalation of pollen in the air, but indirectly as a reflex action provoked by a slight attack of indigestion, or by some unpleasant emotion, such as a sense of grievance, or merely as a result of the patient's desire for attention. Almost any form of emotional disturbance is capable

of provoking bronchial spasm in an asthmatic. Many diseases can be put under this heading of hyper-sensitiveness, and amongst them that large group of illnesses usually referred to as the allergic diseases.

Loose usage of the term "disease"

The word "disease" is used in a very slipshod way, meaning one thing at one time and another thing at another time. It is sometimes applied to the hostile agent itself, such as a streptococcus, and on another occasion it is applied to the defensive response of the body to the organisms by which it is being attacked. When a patient states that he has just recovered from a bad attack of scarlet fever, he has in mind the sore throat, the flushed face, headache and other uncomfortable symptoms from which he has recently suffered, and it is natural that he should regard these discomforts with great disfavour, since it was these reactions of his body which occasioned his distress. Actually they were manifestations of the mobilization of his body's defences against the hostile organisms invading it, and but for them he would have died. It is inevitable also that bacteriologists should take a bacteriological view of scarlet fever and should think of it in terms of the cultures that they made from their patients' throats. Bacteriologists would be inclined therefore to refer to a patient's recent attack of scarlet fever as a case of acute streptococcal infection. Now, in scarlet fever a clear distinction can be made between the infective agent and the body's reaction to it, but it is impossible to do this in the case of many diseases owing to the fact that their primary cause is unknown. Diabetes is an example of such a disease and because it is difficult to be sure of its ætiology, doctors usually think of it in terms of its characteristic symptoms and signs; thirst, loss of weight, susceptibility to

infection and the excretion of sugar in the urine. But a physiologist, when talking of diabetes, would probably lay less emphasis on its clinical symptoms and would think of it in terms of errors in carbohydrate metabolism, errors which can be artificially brought about in animals by removal of the pancreas, or by puncture of the fourth ventricle. "Disease" is therefore a word which means different things to different people.

Conclusions

Having considered some of the types of disease to be met with in medical practice, we are now in a position to arrive at a better understanding of ill-health. We can regard it as an inner disharmony of the organism which prevents it from adjusting itself satisfactorily to its environment and it is because a patient has lost his ability to accommodate himself to changes in his environment that he is generally relieved of the necessity of doing so by keeping him in the more stable environment of his bedroom. His mind and body are thereby given sufficient time to recover their capacity to deal again with the rough and tumble of ordinary living. Our discussion of the term "disease" has also shown us that an illness can be the result of a great number of different causes: of external trauma, as when a man breaks his ribs; of the invasion of the body by pathogenic organisms; of a deficiency, dietetic or otherwise; or of a disturbed functioning of some organ, as exemplified by asthma. Whatever the cause of the disease happens to be, it produces the same result, a state of inner disharmony and a feeling of dis-ease.

Chapter III

THE DOCTOR AND HIS PATIENT

HAVING discussed the nature of health and of disease, we are now in a better position to deal with the subject of the doctor and his patient, and, with that all-important question, the relationship between them. Up till recently this relationship remained a unique one, entirely different from that which exists between the clergyman and his parishioner, or the lawyer and his client. The priest is the servant of God and his mission is to encourage others to live in accordance with the ordinances of the Church. The lawyer is the servant of justice and his work is to advise his client with regard to his legal position and his prospects of winning his law-suit. In contrast to the priest and the lawyer, the medical man has up till recently been the servant of his patient and of his patient alone. It should not matter to the doctor what sort of man his patient is, for whether he be a cad or an admirable person, the restoration of his health is the doctors sole concern. And it is of the greatest importance to both the patient and the doctor that this unique relationship should be preserved. It must be borne in mind that the doctor has to deal with mental and emotional problems as well as physical disorders, and it is essential that he should possess his patient's trust and confidence if he is to succeed in curing him. Unfortunately, a new situation has arisen which threatens to destroy this doctor-patient relationship, to the detriment of both parties. By the passing of the National Health Services Act, the doctor is now in the unhappy position of a servant who finds himself

suddenly called upon to serve two masters. The doctor's loyalties are now divided between the State, by whom he is being paid, and the patient, whom he is trying to cure. More often than not the interests of the doctor's two masters do not come into conflict with each other, but occasionally they do, with disastrous results for the doctor and his patient. It is not surprising therefore that medical men heartily dislike this intrusion of the State into the consulting-room, and believe that it is fraught with danger.

The doctor's genealogy

Before giving an account of the work of the doctor, something must be said about his origin. The medical man is of ancient lineage, which, when traced back, is found to stem from two main streams of ancestry, the medicine-man of primitive society and the priest-physician of ancient Egypt. It is the latter and more honourable line of his descent that will now be followed. Although little is known about the priest-physicians of ancient Egypt, there can be no doubt that their knowledge of the healing art was considerable. The more we learn about this ancient Egyptian school of medicine, the more surprised we are by the extent of its knowledge, including, as it did, knowledge of birth control and of plastic surgery. After the decay of Egypt, the medical science of that country passed, with other forms of learning, to Greece, where Imhotep ("He who comes in Peace"), the Egyptian god of healing, assumed the new name of Asklepios. Temples were built in his honour, and the sick were brought to these shrines to be attended there by the priests. By day they rested in the temples, receiving simple remedies, and at night, whilst they were drowsy with sleep, the priests passed amongst them whispering into their ears comforting messages from the gods. As it was believed that

illnesses were inflicted upon men as punishments and, as the priests were regarded as being divine messengers, these comforting words of theirs had a strong suggestive action on the patients. Baths were given at the temples of healing, as well as herbs and potions. At a later date in Greek history Hippocrates brought about the revolution in medical thought which has already been referred to and the sick were no longer treated by priests and philosophers, but by a new type of man, the physician.

But medicine was not destined to sever for good its connection with religion, and during the Dark Ages priests again became responsible for the care of the sick. Monks ministered to their needs and when more treatment was required to restore them to health than could be given them in their homes, they were taken into the monasteries to be nursed there by lay brothers. It was inevitable that the Church should be compelled to undertake this work of looking after the sick, for during the Dark Ages it was the Church alone which managed to keep the lamps of culture burning in Europe. The Church also founded great hospitals, such as that of St. Bartholomew's, the oldest and perhaps the best known of London's schools of medicine.

It would take too long to follow the history of the doctor throughout the centuries and it will be sufficient for our purposes to omit the intervening chapters in his story and to resume it at the time of the rise of a more scientific form of medicine during the seventeenth century. The application of scientific principles to medicine had a profound effect on the healing art. Science studies only matter, and the more scientific the doctors became, the more completely did their patients' bodies absorb their attention and the less interested they became in what was happening in their minds. The fact

that the sick possessed such things as minds and also something which the priest-doctors of the past had called a "soul" was now entirely forgotten by the majority of medical men. In other words, Western medicine became materialistic in outlook. Without anything having been said it was accepted that the physicians should confine their attention to their patients' bodies and that the clergy should look after their minds. This division of responsibilities between doctor and priest was an entirely logical outcome of Descartes' cleavage of man into the two entities of a material body and an immaterial mind, a cleavage which was destined to have an adverse effect on the whole of Western thought.

The earlier types of doctor

Three centuries ago, medical knowledge was so limited that it was quite possible for one man to be master of it all. At that time three kinds of doctor were to be found, the physician, the apothecary and the surgeon. The physician was the undisputed leader of his profession and the surgeon was of little account. The physician was usually a very well educated man, holding a university degree, and although his social status was below that of the clergyman and of the lawyer, he was often received by the gentry. His position in the medical profession was much the same as that of the consulting physician of to-day. The third kind of doctor, the apothecary, was of a much lower order than the physician. Originally he had been a man who prepared and sold drugs without possessing any medical training at all, but later he was able to obtain from the Society of Apothecaries a licence to practise medicine. The apothecary may be regarded as being the ancestor of the modern general practitioner, many of whom still dispense their own medicines. The apothecaries who

had acquired medical qualifications also carried out many of the simple surgical procedures of their day, but usually, the physician preferred to call in the services of a surgeon whenever an operation was required.

There have been surgeons of great repute in the past, men of the calibre of Celsius, who lived in the time of Tiberius Cæsar, and of Ambroise Paré, born in 1510, but the great majority of the surgeons of the Middle Ages were ignorant and uncouth men, known professionally as cataract-gouchers, lithotomists and booth-surgeons. Queen Elizabeth's private physician, William Clowes, regarded them with such distaste that he described them as being "No better than renegades or vagabonds . . . shameless in countenance, lewd in disposition, brutish in judgement and understanding." Later a better class of surgeons began to appear, and after the founding of the Guild of Surgeons—the forerunner of the Royal College of Surgeons—their character and professional standing improved still further. In course of time the master-surgeon of this guild evolved into the surgeon of to-day, who no longer uses the title of doctor, but refers to himself as Mr. Blank, F.R.C.S. In calling himself "Mister" instead of "Doctor," the Fellow of the Royal College of Surgeons is reminding us of the fact that he is the lineal descendant of the "Master-Surgeons" of the Guild of Surgeons, but it would be more correct if he were to substitute for the word "Mister" the older word, "Master."

The rise of the specialist

In the last decade of the nineteenth century another change occurred in the medical profession. This century saw the dawn of the age of specialization, the age in which we are now living. Up till then the consulting physician, the family doctor and the surgeon had been quite capable of carrying out all that

was required of them, but the many new scientific discoveries made during the latter half of the nineteenth century imparted so strong an impetus to the progress of medicine that this trio could no longer keep up with medical advances. A process of departmentalization began in medicine, and it has continued ever since. As will be seen later, this compulsory dividing up of the field of medicine has been attended with grave disadvantages, but as specialization has been occurring in every other profession, it is inevitable that it should also have occurred in medicine. Whenever knowledge becomes so extended that no one individual is able to be master of it all the specialist has to appear. It is only by his advent that progress can be maintained, and this is true both of medicine and of the still larger field of science. The growth of specialization has occurred quite naturally in medicine. A doctor becomes interested in some particular group of illnesses and begins to study them intensively. If he happens to be on the staff of a great hospital he collects patients suffering from these diseases and devotes more and more of his time to their investigation and their treatment. Later he gains a reputation for his special knowledge in this particular department of medicine and is accepted by his colleagues as a specialist in it. This departmentalizing process has been in action during the last fifty years and has led to the rise of many new types of doctor. When the writer of this book arrived as a student at St. Bartholomew's in 1905, the number of medical experts at that hospital could have been counted off on the fingers of the two hands, but by now their number has been trebled, or perhaps quadrupled.

The dangers of specialization

The disadvantages of specialization are as obvious as are its advantages and they have been crystallized in the well-known

popular saying that the specialist is a man "who knows more and more about less and less." There is truth in this adage, for the specialist looks at the patient through a peephole of his own choosing and manages to see only a small part of him. Because the disorders of a particular organ and their treatment have become of particular interest to the expert, he attributes too great an importance to them and his judgment becomes biased. Even when the specialists of a hospital or of a large clinic work together as a team, they have difficulty in seeing the patient as a whole. Nowhere has team work been brought to a greater state of perfection than at the world-famous Mayo Clinic of Rochester, U.S.A. It is a highly organized institution, with equipment second to none and with brilliant medical men on its staff. Everything in the Mayo Clinic runs with the smooth efficiency of a big business, so much so that it resembles an immense health factory for the sick and the maimed rather than an ordinary hospital or medical clinic. From the moment of his entry there the patient is, so to speak, caught up on a delivery belt and weighed, measured, photographed, X-rayed and electro-cardiographed. His blood and all of his secretions and excretions are submitted to every conceivable form of analysis. During his passage through the numerous departments of the clinic the dossier which accompanies him becomes fuller and fuller of graphs, reports and notes. In short, the Mayo Clinic is a typical product of twentieth-century America, and is an institution in which the art of healing has been raised to the highest degree of efficiency. But when all of these expert examinations and recordings have been completed, it may well happen that little more is known about the patient and his illness than when he entered the clinic's doors. The patient has been so completely dismembered during his passage through the works that

nobody is able to see him as a whole man again. The analysis is so thorough that even the extremely efficient directors of the clinic are unable to put together the pieces. As a human being he has all but disappeared and been replaced by a collection of scientific and medical data. No reflections are being made on the Mayo Clinic. It is merely being used as an example of the dangers of over-specialization.

The general practitioner or family doctor

The moral of this story is that a patient is not a collection of organs encased in a wrapper of waterproof skin, but an indivisible whole. This being so, he must be regarded and be treated as such, and the question that arises is how this can be done and who is capable of doing it. In the past it was the general practitioner who had the broader vision and who, by virtue of his possession of it, was rightly regarded as being the key-man of the profession. He resembled the conductor of an orchestra, a man with a general knowledge of every type of musical instrument, but who does not claim to be a master performer on any one of them. And like the conductor of an orchestra, the practitioner had to know whom to choose when the help of an expert of one kind or another was required. Although he could never hope to become a member of the honorary staff of a great hospital, he nevertheless had his representative there, for the old-time consulting physician was really a kind of super-general practitioner, a man with an all-round knowledge of all the branches of medicine. Amongst the assets of the general practitioner was the fact that he was acquainted with the patient and was familiar with his home and his upbringing. In his capacity of family doctor he had in all probability also known the patient's parents and may have treated him when he was a child. Equipped with all this

valuable knowledge he was able to take a balanced view of his patient's illness, and no one was in a better position to prescribe the right treatment.

All these statements concerning the merits of the old family doctor have been made in the past tense, despite the fact that the general practitioner still survives. He survives, but he is finding it more and more difficult to do so, and the grim fact must be faced that this key-man of the whole profession is in danger of disappearing for good. The recent National Health Services Act is not entirely responsible for this catastrophe, but there can be no doubt that it has added greatly to the general practitioner's difficulties. It has changed him from a doctor to a health official who is no longer in a position to treat patients himself,—he has too little time for this,—but whose chief function it is to steer the sick into other hands. He is in process of becoming a travel agent rather than a doctor, and as such he is beginning to forget the medicine he formerly knew. Seated amongst his filing-cabinets in his consulting-room he spends much of his day filling up forms, providing his patients with certificates of ill-health, or supplying them with vouchers for medical appliances, extra coal and additions to their ordinary rations. Now, it is quite possible that these are the teething troubles of the new Act and that when they have been overcome the general practitioner will be relieved of these irksome clerical duties and be allowed to return to professional work. But it is not surprising that in the meantime some of them are becoming alarmed about their future and are discouraging their sons from entering their father's profession. There is indeed a very grave danger of the old-fashioned family doctor becoming extinct, an event that would be as disastrous to the layman as to the medical profession.

But as has been pointed out, it would be unfair to put too

much blame for the present hardships of the general practitioner on to the new National Health Services Act, for he was encountering difficulties prior to the passing of this Act. These difficulties arose from two closely interrelated causes, the rising tide of specialization and the scientific requirements of modern medicine. Even the family doctor of thirty years ago found it impossible to make his rounds, as his father and his grandfather had done, equipped only with a small bag containing a few drugs, a hypodermic syringe, some bandages, antiseptics and a stethoscope. Before he could arrive at a diagnosis, pathological and X-ray reports might be needed and also perhaps a week of observation in some nursing home or hospital. In other words, the demands made by scientific medicine had become very heavy long before the National Health Services Act added to the general practitioner's difficulties. He could, of course, refer cases requiring further investigation to the nearest hospital, but if he did this they passed out of his hands and were often lost for good. The more enterprising and prosperous of the general practitioners of that time managed to avoid this by sending their patients in to local cottage hospitals where they still continued to treat them. But since the passing of the National Health Services Act most of the smaller hospitals, previously staffed by local practitioners, have been taken over by the State for other purposes. Unable to afford to install X-ray plants in their own houses, or to carry out the required pathological investigations themselves, the general practitioners of to-day are finding it difficult to treat any illness that is not of a trivial nature.

The National Health Services Act

The framers of the 1948 National Health Services Act had no desire to penalize the general practitioners, for they recognized

that the practitioner was an important member of the medical team required for implementing the Act. Far from wishing to make his life more difficult for him, they meant to help him by providing him with the tools he required for his work. These would be found in a number of properly equipped health centres. As these health centres were a very important feature in the Ministry of Health's plans, they must be described in detail.

The health centre was looked upon as being the keystone of the whole medical service, and the section of the National Health Services Act which dealt with them reads as follows: "It shall be the duty of every local health authority to provide, equip, and maintain to the satisfaction of the Minister, premises which shall be called 'health centres,' at which facilities shall be available for all or any of the following purposes: Specialist, general practitioner, dental and pharmaceutical services, any of the local authority's own services, and for the purposes of health education, 'the publication of information on questions relating to health or disease, and for the delivery of lectures and the display of pictures or cinematograph films in which such questions are dealt with.' "

The health centre was therefore designed not only to supply the general practitioner with the equipment he needed for the discharge of his professional duties, but also as a means of co-ordinating the activities of the following departments of the health service:

Care of mothers and children

Care of school children

Vaccination and immunization

Ante-natal and post-natal examinations

Health visiting

Home nursing

Health education

In other words, these centres were to be key structures of the health scheme. They would contain waiting-rooms, consulting rooms, minor operating theatres, laboratories, X-ray plants, lecture-halls and offices in which the medical records were filed. Doctors working in these centres would be provided with the assistance of secretaries, nurses, health visitors and social workers. Another advantage would be that through them the practitioner could maintain a closer liaison with the hospital specialists and with the local health authorities. Finally, he would enjoy what he had never known before, regular working hours and a summer holiday without there being any need for him to find and to remunerate a *locum tenens* out of his own pocket.

The idea of the health centre, as it existed on paper, was an excellent one for everyone concerned. Instead of being herded together in overcrowded out-patient departments, patients would meet in comfortable waiting-rooms, and whilst awaiting their turn they might be invited to listen to lectures on health or to witness a medical demonstration. Nor would they have to waste time and money, as they formerly did, in traveling to and from the hospitals, for everything except serious illness would be dealt with on the spot. The hospitals would also benefit by being relieved of the need of treating the more trivial forms of illness. It was also believed that medical research would gain from the team-work carried out at the centres by medical men and social workers.

Obstacles to the plan

The idea of the Health Service captured the imagination of the public and was welcomed also by the medical profession. The first mistake that was made was to implement the whole scheme at once instead of by stages, and the second to entrust

the task to a forcible politician who antagonized the men whose help was needed to make the health scheme a success. Britain's usual policy was reversed and "too much was done and too soon." For the smooth working of the Act, London alone required 162 centres and a total of 2,000 was needed for the whole country. Not only did the claims of the housing scheme stand in the way of the centres being built—it would have been absurd to have provided centres at the expense of private homes—but the cost of erecting, equipping and maintaining the centres was much more than the nation could afford. It must be borne in mind that the cost of the National Health Service was grossly under-estimated by the politicians, and one of the reasons for this was that they anticipated that advances in preventive medicine would automatically bring about a reduction in ill-health. As a theory this sounds plausible, but in practice it is found to be unsound. Preventive medicine made immense progress during the last half-century, yet the incidence of illness (as estimated by the number of people applying for medical help) continued to rise. One of the explanations of this is that medical treatment is selective in its action. By this is meant that although doctors are becoming more and more successful in curing acute types of illness, they usually fail to eradicate the more chronic forms of ailment, such as chronic rheumatism. All that doctors usually manage to do for patients suffering from chronic rheumatism is to ease their troubles and prolong their lives. From the humanitarian standpoint, this is well worth doing, but from the purely economic standpoint it is unsatisfactory, since these uncured and periodically ailing men and women remain a liability to the State to the end of their lives. A second and still more important explanation of the under-estimation of the cost of the new National Health Service was that its promoters failed

to take into account present trends in medicine. Medicine is becoming more and more scientific and science is always expensive, demanding the use of costly equipment and the services of a large number of technicians and specialists. Each new medical advance tends to increase the cost of diagnosis and treatment still further, and so long as medicine advances so also will expenses continue to rise. In the words of Dr. Ffrangcon Roberts: "A free and comprehensive health service is a noble ideal, but one which the country cannot under existing conditions attain. . . . When the people realize that the benefits which can be derived from the Service depend primarily upon national production, and that these benefits are adversely affected by all inflationary tendencies—restrictive practices, strikes, lock-outs, go-slow tactics—then only will they be worthy of the fruits of their inspiration. Unless our capacity to induce changes in our environment is accompanied by an equal capacity to adapt ourselves to changes, and unless our conquest of nature is matched by an equal conquest of ourselves, we shall lose those characteristics of our national life which we hold dear, and the Welfare State will end in the Totalitarian State."

The future of the general practitioner

Medical practice is in such a state of flux that it is difficult to foresee the future of that key-man in the medical organization, the family doctor or general practitioner. In the opinion of the writer he is in grave danger of eventually disappearing as such, for whatever the vote-catching politician may say, the National Health Services Act of 1948 is the first step towards a State medical service. Nothing is ever obtained without payment, and the payment made for the conversion of the private practitioner into a State official will be the

sacrifice of the unique relationship which formerly existed between the doctor and his patient. It has already been pointed out that this relationship is a very intimate one and that patients often confide to their medical advisers information that they would be unwilling to impart to anyone else, secure in the knowledge that their secrets will never be divulged. The sanctity of the consulting-room has already disappeared, for theoretically, at any rate, health officials have the right to examine a doctor's medical files. The old-time relationship of confidence and trust between patient and doctor is therefore in danger of disappearing. Doctors are not what they formerly were to their patients, nor are patients what they formerly were to their doctors, and the reason for this is that the State now stands between them.

The effect of the Act on the quality of medical practice

As has been shown, we doctors inherited the idea of service to humanity from our forerunners, the ministering monks of the medieval Church. It is true that we, unlike our predecessors, receive fees for our work, but the idea of service has never entirely disappeared. In former days many of the doctor's poorer patients received free treatment either in his private consulting-room or else at the hospital, but whether they paid fees or not made very little difference to the care with which they were attended. But now that the doctor is remunerated for everything he does a new spirit is already beginning to appear in our hospitals. Hours of work, proper intervals for meals, the carrying out of only formal duties, all the well-known rules of trades unions, have now to be observed by porters, technicians and other laymen employed in these institutions, and woe betide the medical man who invites an employee to exceed his official duties. The old-time

idea of service to the sick which previously permeated all ranks of the hospital services is on the wane, and it may well be that what is already apparent amongst lay workers will eventually spread to the resident and visiting medical staff. Nor will it be surprising if the general practitioner loses much of his enthusiasm for keeping up to date in his work. The more promotion depends on the goodwill of superior officers instead of on initiative and professional skill, the poorer becomes the quality of a man's work. It must be accepted, therefore, that the price exacted for the transformation of a private doctor into a State official will be a high one.

Chapter IV

PRINCIPLES OF MEDICAL TREATMENT

AT first sight the doctor of to-day appears to be so lavishly equipped with remedies that to the laymen's mind it must sometimes be difficult for him to decide which one to use. But when we come to examine these remedies more closely we find that numerous though they be, they are capable of being placed under a comparatively few headings. In other words, medical treatment is guided by some half-dozen principles, and it will be helpful to the understanding of what is to follow if these principles of medical practice are enunciated.

The first and the most important of all guiding principles in medicine was laid down by Hippocrates some 2,000 years ago. It is to the effect that no remedy must ever be prescribed which may injure the patient. In the present state of medical knowledge, it is inevitable that a doctor should sometimes recommend treatment that proves to be entirely useless, but on no account must he risk giving anything that might possibly do harm. Every doctor makes the promise that he will not endanger the life of his patient by his own treatment on becoming qualified, for it forms part of his Hippocratic oath: "I will use my power to help the sick to the best of my ability and judgment; I will abstain from harming or wronging any man by it. I will not give a fatal draught to anyone if I am asked, nor will I suggest anything. Nor will I give to a woman means to procure an abortion." To avoid injuring the patient in any way is not only an ethical, but also a common-sense measure, for it is the healing power of the patient's body, the *vis medicatrix naturae*, which is the curative agent in illness. The

doctor himself never cures his patient. All that he really does is to aid as best he can the healing forces of Nature. He is Nature's humble assistant who stands by and intervenes only when he feels that he is able to help. He also assists by protecting his patient from all outside interference. "*Je le pensay et Dieu le guerit*," wrote that great medieval surgeon, Ambroise Paré, who was a faithful observer of this first great principle of medicine. And in the age in which Ambroise Paré lived and practised his art many of his colleagues were flagrant offenders against this first principle. Their remedies were not only useless, but often harmful. In his journal, Paré describes how it was the custom to anoint all amputation wounds with a mixture of boiling oil and treacle, and he recounts that, as a young Army surgeon, he was called upon to follow this practice. But after a battle his oil ran short and he was forced for lack of it to substitute what he calls "a digestive made of yolk of eggs, oil of roses and turpentine." To his surprise and delight, the patients whom he treated in this unorthodox manner fared better than did those treated in the usual way. As a result of this gratifying discovery, he "resolved never more to burn these cruelly poor men with gunshot wounds." Ambroise Paré set a standard that all doctors would do well to follow.

The use of rest and activity

The careful regulation of the patient's activities and the enforcement of complete rest whenever this is required is another important principle in treatment. Generally speaking, diseased structures must be relieved of as much of their work as possible, and this is a medical dictum which has a very wide field of application. For example, a fractured arm must be kept immobilized by means of a splint and at a later stage supported by a sling. The movement of a broken rib is reduced by

strapping the chest with plaster so that the injured side moves less freely than does the opposite one. An artificial pneumothorax is created for the express purpose of putting a tuberculous lung at rest, and thus giving it a chance of healing. This is done by letting gas or air into the space between the lung and the chest-wall so that the lung no longer expands with the latter's movements. A disordered stomach is relieved of all heavy work by prescribing a light diet, or by giving the patient pre-digested food. Local rest is supplemented by general rest. In other words, the strain of living is reduced by confining the patient to bed and by forbidding all unessential activities. So important is this principle of rest that in many cases it is all that is required in order to restore the patient to health.

But prolonged rest leads to a deterioration in function and if carried too far it may bring about an atrophy of the tissues. There comes a time in every illness when the procedure must be reversed and activity must be encouraged. In the case of a broken bone, the splint is removed and the patient is told to exercise his wasting muscles. Massage may also be prescribed to improve the circulation and the flow of lymph, or electricity is ordered to stimulate activity and restore muscular efficiency. And what is true of the prolonged rest of damaged structures is equally true of prolonged general rest. Confinement to bed leads to a deterioration of the patient's general efficiency, both physical and mental. This is particularly noticeable when the patient is an elderly one. An old patient may lose all desire to get up. He has to be encouraged to leave his bed and to face the world again after his long retirement from it. Some patients are very reluctant to do this because they feel themselves unequal to the strain that it involves, but too long a rest from active life is as injurious to the whole man as is the too prolonged splinting of a limb.

There is yet another method of relieving a diseased organ of its full burden of work, the method of bringing another organ to its aid. An example will make this clearer. The kidneys, the skin and the bowel are all organs of excretion, organs by which the body gets rid of its waste products. In a case of nephritis, or inflammation of the kidneys, the strain on these organs can be reduced by producing a greater activity on the part of the skin and the bowels. This is done by making the patient sweat profusely and by giving him purges, so that more of the body's waste products are got rid of by the skin and the bowel and less by means of the kidneys. Nature herself uses this same method, as was seen when the subject of functional compensation was being discussed in an earlier chapter. The doctor is therefore employing a natural method when he relieves the kidneys of some of their work by stimulating the action of the bowels and the skin.

Treatment with drugs

Before discussing the place of drugs in medical practice, something must be said about the way in which they are believed to assist the patient's recovery from illness. There are two schools of thought on this subject, the allopathic and the homœopathic. A member of the first of these two schools of medicine usually prescribes drugs in order to counteract the symptoms produced by the disease, or at any rate to reduce their violence. For example, the painful colic caused by muscular spasm is relieved by means of such auto-spasmodic drugs as opium, or else, more simply, by applying heat to the site of the pain. A member of the homœopathic school of medicine acts on an entirely different principle. He maintains that as symptoms are the result of the body's struggle to recover its health, it is a mistake to damp down or oppose in

any way its efforts. *Similia similibus curantur* is the motto of the homœopathic doctor and instead of giving drugs of an opposite nature he prescribes minute doses of drugs producing reactions similar to those of the illness. The truth is that both principles have their places in medical treatment and that the remedy selected must meet the patient's special need. The body is a marvellous structure, with an innate wisdom of its own, but, as has been seen, its reactions to illness are sometimes excessive—so violent, indeed, as to cause harm. Pain is an instance of this. Pain is the body's signal of distress, the alarm by means of which it calls attention to the fact that all is not well and that work must be reduced. Now, distress signals should be flown with discretion, and when answered they should be hauled down. Unfortunately, this does not always happen in the case of pain, and the pain may last so long that it is necessary for the doctor to intervene and prevent it from exhausting the patient. The allopathic school of medicine, the school to which the great majority of medical men belong, frequently employs homœopathic remedies—that is to say, remedies based on the principle that "like cures like." Vaccination is a striking example of this. By giving an injection of a vaccine made out of dead micro-organisms, or of organisms whose virulence has been reduced by some method other than that of killing it, the allopathic doctor mobilizes his patient's resistance against infecting organisms. Both principles are right, and medical men make use of both allopathic and homœopathic methods in their treatment.

The search for medicines

From the dawn of human history, mankind has been seeking curative potions, health-giving extracts and elixirs in the world of plants, and the rarer the plant, the more likely it seemed to

the searchers that it would yield them what they were looking for. Haggard tells us that when the potato was a rare plant in England, during the Elizabethan age, it was prescribed as a medicine and in all probability it gave satisfactory results, for faith is the most important ingredient in medicines. But it is not the only ingredient, and we doctors owe much to the search of our forefathers for magical draughts. Herbalists, medicine-men, wise women and witches have all contributed valuable remedies to our modern pharmacopœia. The herbalist's discovery of foxglove provided us with digitalis and its modern derivatives. From the East has come opium, and from South America two very valuable native medicines, quinine and cocaine. When a belief is as widely spread as this one that curative substances are to be found in plants, there is always some truth in it. But why, it may be asked, should we expect to extract from plants health-giving substances? A plant is a plant and a man a man, and it is difficult to see how the former can supply the latter with anything he lacks. The explanation of the curative properties of plants is that although their chemistry differs from that of a man, their chemical processes are the essential chemical processes of life. As has already been emphasized, all living organisms on the earth are mutually dependent, supplying each other with what is required in the way of food. Our dependence on the vitamins derived from the fruit and vegetables in our diet shows how close is the interdependence between the various forms of life on the earth. If therefore we have to rely on vegetable life for such necessities as vitamins, it is not in the least surprising that they should also yield us substances of value to our bodies when we happen to be ill. The instinct that drove primitive man to search for medicines amongst the plants was a sound one.

Nor was it only in the vegetable world that he sought

healing drugs and substances. He looked for them also amongst the animals and sometimes succeeded in finding them there. The most striking example of this that is known to me was recounted to me by a European who had formerly resided for a long time in the Far East. He told me of a European lady who had lived in China and who suffered from a severe form of anæmia, which European doctors in China had been unable to cure. The usual iron remedies had been prescribed, but without any benefit to her. Then, on the advice of a friend, she consented to see an old Chinese drug merchant, who gave her some pills that had an immediate and miraculous action on her anæmia. On inquiring of him later what his pills contained, he told her that they were made out of the dried livers of crows. It was the duty of the boy who always accompanied him to shoot down these birds as they perched on the roofs of houses and thus keep him well supplied with what he needed. Some thirty years later Western doctors discovered the curative action on anæmia of extracts of liver.

Although primitive man's belief in the curative action of extracts made from plants and animals has been justified, the layman tends to exaggerate the importance of the bottle of medicine and the box of pills. For many patients these are the only remedies required for restoring them to health, and unless they have been provided with a prescription, they are disposed to believe that they have not been properly treated. This is one of the reasons why the drug bill of the Ministry of Health has now risen to such a formidable figure. The patient demands medicine and the doctor often prescribes it on the grounds that it will do him no harm and, through its suggestive action, may even manage to do him good. And the more pressed for time the doctor happens to be, the more disposed he is to hand his patient a prescription, for this is the easiest

way of cutting an interview short. All patients desire to get well with as little trouble to themselves as possible and there is no form of treatment which exacts so little of a patient as the taking of medicine and the swallowing of a pill. Even the man whose wrong manner of living is entirely responsible for his illness would rather be given a "corrective" than be compelled to change his bad habits. So the magical bottle and the miraculous pill continue to be popular both with the patient and the doctor. "Throw physic to the dogs. I'll none of it." Few patients are of Macbeth's opinion.

Specifics

At the beginning of this century an entirely new movement started in the drug treatment of disease. This subject will be dealt with more fully later, but it is of such importance that something must be said about it now. Up till the end of the nineteenth century the giving of drugs was based on empiricism—that is to say, on the method of trial and error. A doctor learnt from experience that a given preparation did good in certain types of illness, and he therefore prescribed it in illnesses of this nature. Or, if he had no personal knowledge of it, he profited from the experience of others as recorded in medical literature and made use of the drugs they recommended. And this purely empirical use of drugs often gave excellent results, even although the doctor could not explain the manner in which his medicines worked. But in the first decade of this century a great German chemist, Ehrlich, initiated a new movement in medicine which can be termed "the search for specifics." He believed that a specific remedy existed for every disease and that it was the duty of the chemist to find it by making a number of different chemical compounds and testing their action, first, on animals, and then on human volunteers.

Arsenic had for long been used in the treatment of syphilis, and apparently with benefit to the patient, so he set out to find an arsenical specific for this disease. He made a great many arsenical compounds and in his six hundredth and sixth experiment he found what he had been searching for. He had manufactured a compound of arsenic which when injected into a patient's bloodstream led to the rapid disappearance of the organisms of syphilis without apparently causing harm to the patient. The year 1909 marks therefore an epoch in the history of medicine, for this was the first time that a drug had been expressly made for the cure of a definite disease. Since then Ehrlich's achievement has been many times repeated by other chemists, and the partnership which has grown up between the chemists and the medical profession has proved a very fruitful one. This subject will be dealt with more fully in Chapter VIII.

Sir Alexander Fleming's discovery of penicillin in 1938 introduced another new principle into medicine, a principle epitomized in the old saying, "Set a thief to catch a thief." It also illustrates how close is the relationship that exists between the various constituents of organic life, some of which assist each other and others of which devour each other. This is another subject that will be dealt with more fully in a later chapter.

Dietetics

The body has often been likened to an engine and the analogy is an apt one. It resembles an engine in that it is a transformer of energy; it takes in fuel in the form of food and air and transforms these into energy of a different kind, such as heat and muscular and mental work. It is therefore the doctor's duty to play the part of the engine-driver and to ensure that his patient is supplied with the right kind of fuel,

and that the waste products formed during its conversion into heat and work are satisfactorily eliminated. That a patient must be given the right kind of food has always been known to be important, but the discovery of the vitamins has placed such emphasis on it that experts in dietetics are now attached to the staff of many of our larger hospitals. All that it is necessary to say about this subject is that skill in the use of food is an important item in the physician's repertory of treatment.

Physiotherapy

Under this heading can be grouped a large number of remedies of a physical nature, such as massage, balneotherapy, the various manipulations employed by "bonesetters" and osteopaths, light treatment and the use of various forms of electricity. Ancient though some of these physical remedies are—bath treatment had an important place in Greek and Roman medicine—recent advances in physics have led to a great increase in the number of electrical remedies available to the physician. As will later be shown, it is likely that some of these new forms of physiotherapy will become of still greater importance in the future.

Two other methods of treating illness have not yet been mentioned, the surgical and the psychological, but these subjects are of such importance that they will require chapters to themselves. All that is being attempted in this chapter is to give the reader a bird's-eye view of the whole field of medicine and to formulate the more important guiding principles of medical practice. This will enable him to understand the present state of medicine and to realize the direction in which it is moving.

Chapter V

BODY AND MIND

So far attention has been focused entirely on the body and nothing has been said of a patient's mind and of the effect it has on his illness. Yet we all know from personal experience how intimately our bodies and our minds are related and how strongly the one reacts on the other. A gastric upset renders us irritable and, conversely, anxiety and irritability are capable of disturbing our digestions. So marked are the repercussions of the body on the mind and of the mind on the body that it is often difficult to tell which of these two entities was responsible for our indisposition. The truth is that body and mind are inseparable and that a disturbance of the one is immediately communicated to the other. Illness has been defined as a state of inner disharmony, and this disharmony implicates both sides of our nature. To go further and to discuss how body and mind interact and how a disharmony in the one brings about a disharmony in the other would lead us into the realms of philosophy and into a particularly difficult region of it. For thousands of years philosophers have been discussing the body-mind problem, and no satisfying explanation of it has yet been given. All that need be said on this difficult subject is that most doctors have accepted, without stopping even to question it, the Cartesian idea that an immaterial mind lives within a material body, and they act on the assumption that in some cases they are treating a malady of the one and in some cases a malady of the other.

This is a notion that would be unacceptable to the majority

of philosophers, for it is difficult to imagine how such different entities as a material body and an immaterial mind can meet and act on each other. Numerous attempts have been made by dualist philosophers to get over this difficulty, but for present purposes it is unnecessary to discuss them. We can accept the fact that the mind does manage to affect the body and the body the mind without attempting to explain the mode of interaction. A convenient way of side-tracking the body-mind problem is to look upon a man not as being made up of two entities, body and mind, but as being a concourse of living events, some of which are of a physical nature and others of a psychological nature. Illness can then be regarded as a disturbance of the orderliness of these two kinds of events, and the doctor can be likened to an administrator who is trying to restore peace. This is a more accurate way of representing the work of the doctor than the more usual one of regarding him as an engineer struggling to repair a broken machine. A breakage is a static condition which does not alter from day to day, whereas a common characteristic of illness is that it is continually changing its character. This is particularly true of illnesses in which mental events are playing a leading part. At his first visit to the doctor a neurotic patient will complain, perhaps, of depression, irritability and fatigue; at the second of headache; at the third of indigestion and so on, his symptoms never remaining for long the same as they were before. In other words, his illness resembles life itself in that it is a flux of events, and in many ways the ancient notion that illness was due to "possession by a devil" has more to commend it than has the modern one that it is the result of a breakage in the body's machinery.

The rise of psychological medicine

As has been said, the doctors of the eighteenth and nineteenth centuries were so interested in their patients' bodies that they lost sight of their minds, and even when the fact that their patients' minds were at fault was forced on their attention, they still sought to explain these psychological disturbances in physical terms. For example, the emotional outburst of an hysterical woman was attributed to the fact that her womb was misplaced, and so convinced were these materialistic doctors of the correctness of this view that they often performed operations for the correction of the misplacement. Medical theories have always reflected the prevailing philosophy of the age and the nineteenth century was materialistic and deterministic.

In the eighteenth century a Viennese doctor named Mesmer sought to give another explanation of psychogenic illnesses in terms of a mysterious vital force to which he gave the name of "animal magnetism." He believed that it was possible to use this vital force as a curative agent, and in 1778 he moved to Paris in order to put into practice his new form of treatment. Within a short time of his arrival there Paris was thrown into a wild state of excitement by the extraordinary cures that this strange doctor from Vienna was effecting. Mesmerism became a vogue, but as Mesmer was an astrologer as well as a healer and attended his patients dressed in the garb of a magician, he incurred the displeasure of his medical colleagues. After a meteoric career, he fell into such disfavour that he was forced to leave Paris and to retire to Switzerland. His cures were brought about by producing in his patients what was called a "mesmeric trance" and were actually examples of the curative action of suggestion made under hypnosis. A century later this

form of treatment was revived in France by what is now known as the "Nancy School" of medicine, and again it was attended with a certain amount of success.

During the last quarter of the nineteenth century great advances were made in the anatomy and physiology of the central nervous system, and neurology became a new speciality in medicine. But the neurologists were interested mainly in the diagnosis and treatment of diseases associated with gross physical changes in the central nervous system, and it was not until the first decade of this century that the expert in functional disturbances of the central nervous system first appeared. These new experts in nervous troubles were called psychiatrists, or psychotherapists, and as so often happens in the case of medical innovations, their intrusion into the field of medical practice was resented. But little by little they gained in favour and eventually a place was found for them in the profession. There were many cases of illness of a predominantly psychological nature with which the ordinary physician found it exceedingly difficult to deal, and when he failed to cure them—as he usually did—he found it convenient to unload them on to the psychiatrists. The founding of psychological clinics at the larger hospitals a couple of decades ago indicated that the battle for a more psychological outlook in medicine had been won. Although psychological methods of treatment are still looked upon with amusement tinged with disdain by a few modern doctors, the great majority of us regard psychiatrists as valuable members of the profession.

The Vienna School of psychology

The Vienna School of psychology founded by Sigmund Freud did much to popularize this new psychological department of medicine. Freud made two very important contributions to

our knowledge of functional disorders. First, he showed that the main cause of psychological disturbances was the existence of a conflict in the unconscious regions of the patient's mind, a conflict which had often had its origin long previously in the days of the patient's childhood. He also taught that if the warring elements in the patient's unconscious could be brought back into consciousness, so that they could be reviewed in the light of adult and maturer experience, the patient was often cured. But to bring back these warring elements into consciousness was a very difficult task, owing to the fact that the memory of them had been deliberately repressed. The patient struggled against recalling them because they were painful to him, and he actively resisted the analyst's efforts to revive them by the method known as "free association." To carry out this treatment, the patient is instructed to recline comfortably on a couch and to talk as freely as possible of his past, without censoring or selecting what he says. Step by step he goes back into his past, reviving all his old memories and allowing his associative thinking and his feelings to have free play. Eventually some of his less pleasant memories rise up into consciousness, memories of events which he now hesitates to recall. These are usually connected with his former relationship with his parents, or with his brothers and sisters, and it may well be that these old difficulties and emotional conflicts are the cause of his illness. This process of analysis is usually long and arduous, owing to the patient's unwillingness to reveal what he has so long hidden not only from the world, but also from himself.

Freud was of the opinion that the majority of conflicts that are responsible for neuroses are of a sexual nature, for sexual conflicts are associated with a strong feeling of guilt. Although Freud's two brilliant disciples, Adler and Jung, acknowledged

the value of Freud's analytical method and practised it themselves, they were of the opinion that he had laid too great a stress on the sexual urge as a source of neurosis, and they began to search for other forms of conflict. Adler eventually came to the conclusion that the stresses developed by the individual in adjusting himself to society and his innate desire for power were frequent causes of functional disorders, and Jung was of the opinion that neuroses arose from a breakdown in the patient's psychological mechanism for regulating creative impulses other than those of sex. Jung also gave a somewhat wider interpretation to the word "libido" than Freud had done, and equated it with "vital force," or the universal life energy. He claimed that many complexes had their origin not in the "personal unconscious" of the individual, but in the more comprehensive "collective unconscious" of the race. Finally, he gave a religious turn to his theory and formulated a less pessimistic and more positive type of philosophy than Freud's. Medicine owes a great deal to all three of these great pioneers in psychological medicine and to the various schools of thought that they founded.

Classification of mental illnesses

Before a patient suffering from a psychological disturbance can be satisfactorily treated, as precise a diagnosis as possible must be made. As we know even less of the working of the mind than we do of the working of the body, diagnosis is often difficult. A number of methods of classifying diseases of the mind have been offered, but a simple and fairly satisfactory one is to divide them into three main groups: (1) the organic, (2) the toxic, and (3) the functional. An organic case is one in which there exist structural changes either in the brain or in the blood-vessels supplying it. These more serious types of

mental illness that are associated with physical lesions are referred to as the psychoses. Senile dementia, brought about by arterio-sclerosis or hardening of the cerebral blood vessels followed by degeneration of the delicate brain tissues, is a good example of a psychosis. In toxic cases some poison (internal or external) is responsible for the mental trouble and alcoholism and the delirium associated with high fever are examples of this. A functional neurosis is a disturbance of mental functioning for which no physical cause at all can be found. Hysteria, anxiety and obsessional neuroses and neurasthenia are examples of functional troubles of this kind. But it has to be admitted that the use of the adjective "functional" is not necessarily justified, for it is quite possible that when our methods of examination become more exact, physical changes will be found to be present in these cases, so that they will have to be placed under another heading. Should this advance be made, not only will our methods of diagnosis have been improved, but so also will we be able to improve our treatment of them. That Freud confidently believed that the day would come when neuroses would be treated by physical methods is clear from the following: "Considering the close connection," he wrote, "between the phenomena we distinguish as somatic and psychic, we may predict that the day will come when our knowledge, and it is to be hoped, our control of the biology of organs and their chemistry, will enable us to approach the domain of the neurosis from this angle. This day seems still far distant, for at present these disturbances are wholly inaccessible to us from the standpoint of medicine."

The method of classification that has been offered must be accepted therefore as a convenient rather than as an exact method of classifying the different forms of psychological illness.

Methods of treatment

The treatment of patients suffering from mental disorders may be said to have four aims: (1) to safeguard them from physical danger so long as they are incapable of looking after themselves; (2) to improve their general health and thus facilitate their psychological recovery; (3) to bring about an adjustment of their psychological difficulties and assist them in finding a satisfactory relationship with their surroundings; (4) to make use of one of the special physical methods now available for the treatment of cases that have not responded to other remedies. The special physical methods of treatment to which reference is being made will be described later.

Rest cures

At one time the so-called rest cure was the standard method of treating all forms of neurosis. Its aim was to protect the patient from all external shocks and strains by keeping him in bed either in his own home or preferably in some clinic. Protected thus, well-fed, skilfully nursed and allowed to see only an occasional visitor, if such were the patient's desire, it was believed that he would slowly recover his mental health, and this he usually did when his illness was due only to fatigue. In those cases in which the stress and strain of living were not the main cause of his illness, the treatment usually failed, or yielded only temporary results. It is, of course, a general principle in the treatment of neuroses to remove the patient from the environment in which he suffered his breakdown. But unfortunately the patient takes himself and all his emotional problems with him into the clinic and it is these problems and his own faulty attitude to life that have been responsible for his collapse. A man who is worrying about some

imaginary trouble can worry just as effectively about it whilst lying in bed as when he is up and about, and perhaps more effectively, since in bed there is little else to distract his attention. For this reason the so-called rest cure had, and still has, only a very limited value, and even if it brings about a partial recovery, the patient is likely to relapse subsequently on returning to his customary life.

To-day the rest cure is usually supplemented by the use of narcotics given for the purpose of reducing mental activity to a minimum and inducing sleep. This "sleep treatment" was used during the late war and proved efficacious in cases of "shell-shock" caused by being blown up or buried by high explosives. The aim of the treatment was to induce sleep for some twenty hours out of the twenty-four-hour day, and it was continued for anything from a few days up to two or three weeks. Naturally, this prolonged use of sedative drugs needed expert management and good nursing if the general condition of the patient was not to suffer from it. Sleep treatment of this kind is analogous to the prolonged rest given for certain forms of physical illness, such as a fractured thigh or a badly damaged heart, and is based on the general medical principle that an injured organ must be relieved as much as possible of its work.

Psychological methods of treatment

Some psychiatrists are of the opinion that toxæmia is a very common cause of mental illness, and they make an intensive search for disturbances of metabolism or for infection in the sinuses, in the bowel, or elsewhere in the body. Having found the presumed cause of the trouble, they treat it with the greatest thoroughness in the expectation of bringing about a cure. For them the physical treatment of the patient takes

precedence of any form of psychological treatment. Now, whilst it is quite true that toxæmia often precipitates a mental breakdown, and that the physical health of a neurotic patient is of the greatest importance, it is a mistake to put too much emphasis in the physical factors in mental troubles. In the great majority of cases the psychological investigation and handling of the patient is of far greater importance than is the physical treatment. It will be necessary therefore to discuss briefly the principles on which psychological treatment is based.

Man is far from being the well-balanced and integrated person that many people believe him to be. He is rarely, if ever, what Henley called him, "the captain" of his soul, but instead is a medley of primitive urges, irrational desires and conflicting thoughts which pull him first in this direction and then in that. The course he follows resembles that taken by a captainless ship, which is being steered by a brawling crew; a ship at the mercy of every change of wind, tide and current. It is not in the least surprising that a man's contradictory thoughts, emotions, ideals and instinctive urges, and the conflicts which these differences engender often become so distressing that he breaks down under the strain of them. What complicates his situation still further is that he is generally quite unaware of the nature of these inner stresses—unaware of them because they are buried deep down in the unconscious regions of his mind.

In order to explain the genesis of mental illness, Freud gave to the human mind a hypothetical structure. He started by dividing it into three regions. The lowest and least conscious of these was the Id, in which there dwelt a number of primitive drives, or urges, all of which were struggling to find an outlet, but which were prevented from finding it by the more conscious parts of his mind. The second region was the Ego, or

what is usually called the personality, a region of the mind which he regarded as being partly conscious and partly unconscious. The third element of the mind was the Super-ego, which can be visualized as an off-shoot of the Ego. According to Freud, the Super-ego was the repository of the individual's ideals, many of which were not really his own, but had been forcibly imposed upon him by his parents or nurses.

Having provided a metaphorical map of the mind and at the same time produced a kind of psychological caste, Freud showed how these undisciplined actors produce trouble in the drama of human life. The usual source of it was that the least conscious and also the most disreputable of these characters, the primitive urges dwelling in the Id, demanded a much larger part in the drama, and that the more respectable and conscious actors refused to permit this. They sternly repressed them, and as a result of these disciplinary measures tensions were produced, which gave rise either to psychological, or to physical, symptoms. According to the analyst, the right treatment for this unhappy state of affairs is to discover the precise nature of the conflict by bringing it up into the light of consciousness so that the patient is able to see its true character. When viewed thus in the light of his maturer experience, he realizes that it is a storm in a tea-cup and the tension from which he has hitherto been suffering disappears. The theory is a plausible one, and when put into practice it often gives satisfactory results. This, in short, is the underlying basis of psycho-analysis, a subject which must now be considered from a practical standpoint.

Psycho-analysis

Psycho-analysis is a valuable method of treatment, but it has grave disadvantages, the most obvious of which is that it

demands a great deal of time and, since time is money, much expense. In order to profit by analysis a patient may have to visit his psychiatrist three or four times a week for an unspecified period, and he will have to embark on this treatment without any guarantee being given him that he will be finally cured. An initial act of faith is therefore required of him of which he may or may not be capable. Even if he is prepared to accept this condition, there is often another question that he will have to ask himself: Can he afford to spend all this money at a time when he is finding it difficult to remain at work? These are difficult decisions for a neurotic patient to make when indecision is one of the features of the disease from which he is suffering.

Criticism of psycho-analysis

The value of the analytical method of treatment must be assessed by the pragmatic test. The question to be asked is: How often does it give satisfactory results? Reliable statistics are not available for any accurate estimation of the ratio of cures to failures, but some authorities have claimed that, provided analysis is carried far enough, cures can be expected in 22 to 25 per cent. of cases. This is but a poor recommendation for a treatment which may have to be carried on for many years, and, as E. B. Strauss has pointed out, an equal if not a higher percentage of cures can be obtained from psychotherapeutic measures of a far less tedious character. In Strauss' opinion, there is no guarantee that "putting the wheel of time into reverse" and taking the patient "for a ride" in the psycho-analytical time-machine and forcing him to review his infantile conflicts in fantasy is in itself . . . going to help him to make a satisfactory adjustment to actuality." I agree with him that analysts place too much emphasis on the past and

underrate the importance of the present in helping a patient to make an assessment of his total situation. The problem that is facing him as an adult may be quite different from that which formerly faced him as a child, and in their anxiety to uncover the past, the analysts are apt to pay too little attention to the present. There is a family likeness between the problems of the past and of the present, but it is absurd to regard them as identical.

Another weakness of the analytical method is that it is non-constructive. It can free the patient from the sense of guilt and the fear from which he has been suffering, and enable him to accept himself as he is and not as he would like to be, but it leaves him without future guidance. This is particularly true of the Freudian branch of the analytical school. The Freudian excuses this by stating that it is not for the analyst to impose on the patient his private philosophy of life, but for the patient to discover one for himself. This effort to be strictly impartial makes very little difference in the end, for what happens is that the patient who has benefited from his treatment takes unto himself the philosophy of the man who has relieved him of his neurosis.

The Freudian system of psychology is regarded as being much more than a corpus of knowledge on which a certain method of treatment is based. Extravagant claims have been made for it. It has been hailed as a philosophy through which history finds a new interpretation and literary and artistic criticism can be given guidance. Children should be brought up in accordance with its tenets and religion must be re-examined in its light. However diffident the analyst declares himself to be about imposing his private philosophy on his individual patient, he does not hesitate to commend it in the most extravagant terms to the world at large.

The present position with regard to analysis

In this country the Freudian outlook is no longer as fashionable as it used to be, but in America it is still popular. There is many a wealthy American woman who regards it as an alternative to bridge, a means by which a tedious and purposeless life is rendered bearable. Hostesses and guests eagerly discuss together the merits and demerits of their respective analysts and compare notes on the stage reached in the analytical pilgrimage. They make their daily visits to their analysts and there, stretched out luxuriously on confessional couches, grope their way back into the past, reviving girlish hopes and fears, old emotions and dreams. I am told that those who can afford this make use of what is now known as "multiple" analysis. Not one, but three, experts are engaged, one of them a male, another a female and, because rival analysts are apt to keep their discoveries to themselves, a third analyst whose function it is to act as a co-ordinating agent. It is characteristic of Americans to do things on a grand scale.

Treatment by hypnosis

Suggestion plays a part in all forms of medical treatment, whether it be deliberately used or not. Suggestion under hypnosis is much more potent than suggestion in the ordinary state of consciousness, but it is seldom used now in the treatment of neuroses, and for two reasons. The first is that the results obtained from it are usually of a temporary nature, owing to the fact that although the symptoms have been removed, the emotional conflict responsible for them still remains unresolved. A second and graver objection to hypnotic suggestion is that it may leave the patient in a worse position than before. For example, a patient who previously suffered

from a functional torticollis, or wry-neck, may be cured of this physical deformity, but he may be thrown into such a state of mental depression that he would gladly revert to his former trouble. Hypnotic suggestion is a remedy that must be used with the greatest care and only by experienced psychiatrists. Until we know much more about the mind and about the nature of hypnosis, this form of treatment is not likely to be given an important place in psychotherapy.

Physical measures

Earlier in this chapter mention was made of certain physical measures to which the psychiatrist could resort when all other methods of treatment had failed. Some authorities are of the opinion that these physical measures have no place at all in psychotherapy and that they should never be used. Strong arguments can be brought to support this point of view, but so long as psychological treatment is attended with so many failures as it is at present, we cannot afford to dispense with any remedy which sometimes gives excellent results. The two remedies in question must therefore be considered.

Electrical convulsive therapy

Convulsive or shock treatment is a development of an older method in which convulsions were evoked by the injection of such drugs as insulin and camphor. The same results are now obtained and the convulsions are better controlled by passing a current through the fore part of the patient's brain. Because very violent muscular spasms may occur as the result of this, special precautions have to be taken in order to safeguard the patient from muscular or bony injury. In the ~~earlier days of~~ convulsive therapy such injuries were frequent, but with improvements in technique they have now become much

rarer. The duration of the electrical treatment and the number of fits that have to be produced varies greatly in different cases. Some patients respond quickly, some respond and then relapse unless the treatment is continued, and yet others require a prolonged course before they show signs of benefiting.

The question will naturally be asked why the production of a fit should help a patient who is already suffering from mental confusion. No simple and satisfactory explanation can be given of the rationale of the treatment. All that can be said on the subject is that mental activity of every kind is associated with the development of electrical currents in the brain and that it is reasonable to suppose that in mental illness the pattern of these brain currents is disturbed. It can also be supposed that by momentarily swamping the feeble brain currents with a much stronger one the electrical pattern of the brain is again altered and this time for the better. Convulsive therapy is admittedly a crude and blind method of treatment resembling the shaking of a watch when it has stopped in the hope that the shaking will start it going again. Whatever be the true explanation of its action, there can be no doubt that convulsive therapy often succeeds when more refined and exact psychological methods of treatment have failed. The ill-effect most likely to be noted after a course of treatment is loss of memory but fortunately this is usually temporary, the memory improving a few weeks after treatment has ceased.

Leucotomy

This is a far more drastic method of treatment and its adoption is justified only when the psychosis is of a very serious nature and when all other measures have failed. It consists of dividing certain nerve tracts which run from the great

nuclei at the base of the brain to the frontal lobes, tracts which are believed to impart to our thoughts an emotional tone. There has been much discussion in the medical press concerning the use of this measure and some medical men are of the opinion that resort to leucotomy is never justifiable. Not that there is any serious risk attached to the operation itself. Actually, the immediate risk is a comparatively small one, but the grave disadvantage of the operation is that it permanently alters the character of the patient. It is difficult to define the change which is brought about in him, but it would be true to say that it removes his initiative and renders him placid and sometimes almost completely listless. The great benefit he has received from the operation is that it has removed the intense anxiety from which he has hitherto suffered. When the operation is done under a local anæsthetic the change is so dramatic that the patient has been known to exclaim: "Oh what a relief." That the results of leucotomy are often satisfactory is shown by the fact that approximately one-third of the asylum patients submitted to it are able to return home a few weeks after the operation and a number of them have recovered sufficiently to allow of their resuming work. When the two alternatives to be considered are lifelong confinement in a mental institution and subjection to leucotomy, with the possibility that the patient will subsequently be able to live at home, the operation cannot be lightly dismissed. Yet it is imperative that this form of treatment should only be used as a last resource for very bad cases, for the sacrifice of the creative spirit and of the higher qualities of the mind is a very serious one. Refinements in the technique of the operation have now been made which reduce the damage inflicted on the brain and there is every likelihood that in course of time it will be done with still less cost to the patient. Not that

leucotomy will ever be performed without some price being exacted of the patient, for an operation which removes an emotion so prevalent amongst men as is anxiety cannot be expected to achieve this object without impinging on other emotional states. Man is not in possession of enough wisdom and psychological insight to be able to make a true appraisal of his own emotional constitution and he is able to cause harm in the hope of doing good. Whatever be the refinements made in the future in the technique of leucotomy, it will still remain an operation only to be used in exceptionally grave cases.

Chapter VI

PSYCHOSOMATIC MEDICINE

THE term "psychosomatic medicine" has been used much of late, and there are some who have mistaken it for yet another specialty in medicine. It is not so much this as a sign of a saner approach to all forms of illness, a reminder that illness is not due to the disorderly functioning of a single organ or system of organs, as the doctors of the last century were inclined to regard it, but to a disturbance of balance of the whole man. The term "psychosomatic" also emphasizes the fact that illnesses can seldom be attributed to a single cause, but are almost always the result of multiple causes. After Pasteur's discovery of the micro-organisms, the medical profession tended to attribute too great an importance to them in the genesis of disease. In his introduction to *The Doctor's Dilemma*, that astute observer of medical follies, Bernard Shaw, accused the doctors of having become germ-possessed. All that they seemed to feel it necessary to do in order to cure their patients was to catch the germ and kill it. There was an element of truth in Bernard Shaw's criticism of doctors, for at the time at which he wrote his play they were inclined to single out one of the factors in an illness and to declare that it was entirely responsible for it. A patient developed a crop of boils, and the *Staphylococcus aureus* (the germ almost always found in boils) having been isolated from them, antiseptics were applied and a staphylococcal vaccine prepared and injected, often with satisfactory results. But why did this particular man develop boils and not his fellow men when all

were equally exposed to infection by this ubiquitous germ? Many different explanations of his special vulnerability to staphylococcal infection are possible. He developed boils because he was run down, or because, unknown to himself and perhaps to his doctor, there was sugar in his urine. Why was he run down? Why was there sugar in his urine? He was in debt and overworked at the office. He was an anxious type of man who would be more prone than his fellows to develop diabetes. Every answer provokes in turn another question, and one by one the causes of a patient's illness mount up and are seemingly endless. Instead of accounting for the illness, the *Staphylococcus aureus* is now seen to be only one of the many factors responsible for it.

The term "psychosomatic medicine" is therefore a useful corrective to this tendency on the part of both doctors and patients to over-simplify the explanation of illness. As was emphasized in the previous chapter, no clear division can be made between a patient's mind and his body, so that the word "psychosomatic" acts also as a reminder of the necessity of correlating the physical and the psychological signs and symptoms of illness. The psychosomatic experts are giving us great help in doing this. They are not only showing us that psychological disturbances have an adverse effect on the body, but also that certain psychological types are prone to develop characteristic forms of physical illness. They are engaged in the difficult work of correlating changes in the mind with changes in the body and helping us to bridge important gaps in medical science. Although little is as yet known about this very interesting subject of types and disease, it is of such importance that it must be dealt with at greater length.

The relationship between psychological and physical factors in illness

According to Dr. F. A. Strecker, a well-known authority on psychosomatic medicine, "50 per cent. of the problems, at the acute stage of an illness, and 75 per cent. of the difficulties of convalescence, have their primary origin, not in the body, but in the mind of the patient." An example will make this clearer. A great many deaths are now attributed to coronary thrombosis, or to the clotting in the blood vessels supplying the heart, and it has been found that a certain type of patient is particularly prone to this disease. It is far commoner amongst men than amongst women, and doctors and American businessmen are particularly liable to die from it, more especially if they are of an anxious temperament. What is the explanation of this?

In order to understand better the connection between psychological and physical disturbances, something must first be said about the physical basis of the emotions. We feel and we express our emotions throughout the whole of our bodies, but the physical structures particularly concerned with the emotional life are the central nervous system (the sympathetic system in particular) and the endocrine glands. The central nervous system provides the means by which we move about, talk, laugh and cry and by which we become aware of all these activities, and the headquarters of the central nervous system are located in the brain and the spinal cord. By the peripheral nervous system is meant the various nerves which issue from these main structures, the brain and cord, and it includes, also the nerves which connect us with our various sense organs, through which we receive messages from the outside world. The autonomic, or third part of the central

nervous system, deals with all our inner bodily activities and is a law unto itself. It exercises control over the calibre of our blood vessels, over the activities of the unstriated muscles and regulates the movements of our visceral organs. It acts quite independently of our will and regulates respiration, digestion and the complex processes of our metabolism or body chemistry. In short, it looks after all the inner and automatic working of our bodies. One more fact about this important regulative system requires emphasis—namely, that it is strongly affected by our emotions.

When this automatic part of the central nervous system is examined more closely, it is found to contain two opposing sets of nerves, which, so long as we remain in good health, balance each other and work harmoniously together. These two opposing sets of nerves are called the sympathetic and the para-sympathetic systems. One of them dilates our blood-vessels and the other constricts them; one maintains a constant and steady control over the body, whilst the other comes into sudden action in response to an emergency. Whenever danger threatens us, alarm messages are flashed along the sympathetic nerves to notify the body that it must quickly mobilize itself for flight or attack. In preparation for this flight or attack blood is driven out of the abdominal cavity, where it is no longer required for things of such secondary importance as digestion, and is concentrated instead in the lungs, muscles and brain, causing the blood pressure to rise. The glycogen stored in the liver is rapidly converted into sugar in order that it may be available to the muscles as fuel. The secretions of the suprarenal glands are poured into the blood-stream and the heart beats more forcibly and quickly. When the emergency has passed the parasympathetic system takes over control of the body and restores its former quietude. But let us suppose that the alarm

is being sounded, not by a sudden crisis, but by a prolonged state of anxiety, by the constant irritation of a small personal grievance, or by some imaginary suffering which is never dispelled. In this case the body is constantly maintained in a state of readiness for an emergency which never actually materializes, but which exists only in the patient's imagination. In such circumstances the parasympathetic system is never allowed to come into play, so that it is unable to exercise its pacific action on the overwrought body. The body therefore remains continually on the stretch, mobilized for flight from a foe which has not yet appeared, armed for action against a fifth-column enemy which lives within the very citadel of the individual's being. Small wonder that energy continues to seep away until the body breaks down under the unbearable strain, so that the patient becomes a victim of his own automatic mechanisms maintained in action by his imaginary fears.

The two basic urges of the unconscious mind

Different psychologists have made different catalogues of the various primitive urges dwelling in the subconscious regions of the mind, but towards the end of his life Freud came to the conclusion that they could all be reduced to two basic instincts, a *creative* one and a *destructive* one. He identified the former with love in its various forms, and called the creative urge Eros. The destructive one he called *Thanatos*, or the death wish or instinct. Freud regarded this destructive force as nature's instrument for the ending of life and believed that an unceasing war is waged throughout the whole of life between these two opposing forces. Some people may have difficulty in accepting this idea that there exists in man an instinct for his own destruction, but it is less improbable than at first sight it appears to be. Human behaviour is very strange, much more

puzzling than the behaviour of the animals. An animal is consistent in its actions, which are always directed towards its own preservation. The same cannot be said of human behaviour. There are men and women who dwell always on the negative and sombre side of life and who have an innate relish for tragedy, illness, unhappiness and death. They take pleasure in gloomy events, are bearers of tales of disaster to other people and seem even to enjoy in a perverted way their own misfortunes. By nature they are confirmed pessimists, destroyers of their own peace of mind and health. Dr. Hutschnecker writes of this destructive urge as follows: "If we would understand the dynamics of the destructive instinct, we must regard it as an active principle checked only by the stronger urge of the creative instinct. We can observe how in nature these two instincts balance each other. We can also observe how, in nature as in man, the destructive instinct gains momentum as the creative powers in an individual are exhausted. This is the natural progress of all living things towards dissolution and death" (A. Hutschnecker, *The Will to Live*).

Doctors frequently have to treat men and women who seem to be entirely controlled by this negative and self-annihilating urge. I can recall many such patients whom it was impossible to help because they contained within themselves a mechanism for their own undoing. They were patients who belittled everybody who attempted to help them and resisted all forms of treatment, who clung desperately to their own misery and died for no reason other than that they did not possess the will to live. Many examples of this type of patient could be given. There is the man who has built up a large and prosperous business and who has always led an active creative life at the office. Eventually he is compelled to retire, and because he now finds himself deprived of all his former interests and is no

longer able to create anything at all he goes into a decline and dies. If he could have managed to have directed his creative impulse into another channel, into some absorbing hobby or some other worth-while activity, the destructive trend within him would have been held in check and he would have continued to live for many years. It is no exaggeration to say that so long as a man has something for which he is anxious to live, it matters little how sick he happens to be—he will manage somehow or other to survive until he has accomplished his task.

Human types and their characteristic illnesses

As has already been said, the experts in psychosomatic medicine have confirmed what has always been suspected, and what was taught by the old astrologers, that different types of men and women are liable to develop characteristic forms of illness. Our knowledge of this subject is, as yet at an elementary stage of development, if for no other reason than that Western science knows little or nothing about the ancient science of types. One method of classifying men is to divide them first into the "aggressive" type and the "regressive" type. The aggressive type reacts to difficulties by fighting them, or, if they are too formidable, by fleeing from them, whilst the regressive type deals with them by enlisting the help of, and becoming dependent on, other people. In other words, a man of this latter type tends to regress to the state in which he was when he was a child and relied entirely on his parents. It has been found that an individual of the aggressive, self-confident type is particularly liable to develop one of the following varieties of illness: heart disease, high blood pressure, circulatory disturbances, migraine, hyperthyroidism and rheumatoid arthritis. It will be noted that the organs affected here are those

which come into action when the body mobilizes itself for fight or flight. It is upon these structures therefore that the strain has fallen during the aggressive individual's life. In the regressive type of man the strain is imposed upon another set of organs, with the result that he develops an entirely different set of illnesses, and complains of gastro-intestinal disturbances, indigestion, constipation and diarrhœa. It would be of great interest if we could carry the investigation still further and discover what determines an individual's type, but at present our knowledge of types is too slender to allow of this. Nor can we say for certain whether type is inherited or acquired. Research is now being carried out on this subject, and all that can be said about it at the present moment is that children coming from homes in which the mother is the dominant figure would seem to have a tendency to develop symptoms of duodenal ulcer in later life. This suggests that early upbringing is a factor in determining type, but it is very unlikely that it is entirely responsible for it.

There can be no doubt that nervous strain plays an important part in the development of both cardiac and gastro-intestinal diseases. That anxiety is a cause of digestive troubles is supported by the fact that many of the leaders of the Allied nations during the late war developed duodenal ulcers. Dr. Hutschnecker quotes an extract from a speech made by General Marshall at an Overseas Press Club Dinner: "In Washington I had to contend with, among other things, the ulcers of Bedell Smith in Moscow and the ulcers of Bob Lovett and Dean Acheson in Washington." Nor did the speaker himself escape illness during the war, for he underwent a serious operation. Other casualties amongst the war leaders included Attlee (duodenal ulcer), Bevin (tired heart), Roosevelt (tired heart), Quielle and Schuman (indigestion),

Vishinsky (duodenal ulcer), and de Gasperi (arthritis). Churchill and Stalin managed to support the immense strain imposed on them, and if they developed any physical troubles they managed to maintain secrecy about them.

A study of cardio-vascular diseases also illustrates the close relationship existing between a disease and psychological type.

Cardio-vascular diseases

Cardiac troubles are certainly on the increase both here and in America in spite of the relief given to men working in the heavier industries and in agriculture by the greatly increased use of machinery. It has been computed that cardiac diseases are responsible for more deaths in the United States than are the next five commonest causes added together. What is true of that country is also true to a slightly less extent of this country. Another statement that can be made with confidence about cardiac-vascular troubles is that men are far more liable to them than are women. Yet up till the age of five diseases of the heart and blood-vessels are five times commoner amongst girls than amongst boys. Why is the mortality from cardiac disease so much higher in adult males? It used to be said that this was due to the harder work undertaken by men, which imposed a heavier strain on their hearts. But the women of to-day live far more strenuously than their grandmothers did and compete with men in all the occupations except mining and the heavy industries. It can no longer be said therefore that a woman's cardio-vascular system is subjected to very little strain. The explanation of woman's immunity is more likely to be a psychological one—namely, that men are usually of the aggressive type, the type that is known to be prone to cardiac troubles. Despite the fact that women have acquired their equality with men and are asserting

themselves more and more forcibly in every walk of life, men still remain the more aggressive of the two sexes. The world demands that they should be so, and aggressiveness has been thrust on them by countless years of breeding. When a male meets opposition he responds to it instinctively by attack, or, if he finds the opposition to be too strong for him, he contrives to escape from it. In his capacity of breadwinner he meets competition everywhere and a continuous strain is thereby imposed on his heart and blood-vessels.

Dr. Hustchnecker pictures modern man as being "in a state of mobilization for a battle which is never actually fought to a finish. He is wrestling with a situation which he can neither adjust himself to, nor withdraw from—except by death. A man of action, accustomed to sharp, quick decisions, may choose the sharpest, quickest decision to end his torture; a heart attack." A man of less determined nature who finds himself in this situation will save himself by means of a less drastic device than that of dying. He manages to obtain the rest he so badly needs without losing "face" by developing some form of illness which necessitates his going to bed, and, what is more, he manages to do all this apparently against his will. An illness in this case fulfils a very definite purpose, and there can be no doubt that ill-health is frequently used unconsciously in this manner as a means of escaping from a difficult situation. For example, a young man with ambitious parents is forced against his inclination to undertake some form of work for which he is unsuited and the only way in which he can manage to escape from a situation which he eventually finds unbearable is to become ill. So he develops an illness, not consciously and by design, but by the unconscious working of the hidden parts of his mind. No better solution could possibly have been found for his difficulties than the one that his subconscious mind has dictated to

him. Not only is he relieved of the task which had been thrust on him, and which he always realized he was incapable of doing, but he is rewarded with the sympathy of his parents and his friends. For them he is not a young man who has been unable to make good, but is instead a gifted youth whose whole career has been wrecked from the start by the misfortune of illness. And so little do we know of the secret workings of our minds that the young man in question will himself be convinced of the correctness of this statement made by his parents and his friends.

So purposeful are many illnesses that when a doctor is confronted with an illness for which he finds it difficult to account he will do well to ask himself these two questions: "What purpose does this illness serve?" "In what way does it benefit this patient?" Not that purposefulness is a quality which applies only to the development of illness. Even an accident is not beyond suspicion. More than a quarter of a century ago the German psychologist Marta observed that accidents were sometimes habitual in men and women—in other words, that men and women who had suffered from one accident were more liable to suffer from a second one than were other people who had never had any mishap. Dunbar confirms this idea and states that 80 per cent. of fracture cases have suffered from two or more accidents. It is, of course, impossible to exclude physical explanations of multiple fractures, such as carelessness and awkwardness on the part of the patient or undue fragility of his bones, but the frequency of this phenomenon in the fracture departments of our hospitals is at any rate suggestive. Operations may also provide an excellent means of escaping from a desperate situation. It is not in the least surprising that a patient should occasionally avail himself of this remedy, the suffering inflicted by the surgeon's scalpel being

far less than the long-drawn-out agony of an emotional conflict. The receiving officers of hospitals are very familiar with patients who clamour to be admitted to a surgical ward, patients whose abdominal scars show how frequently they have previously earned a temporary respite from the struggle of life in this way.

The interest now being taken in the psychosomatic approach to illness is of importance because it indicates a reversal of the analytical process which has been going on in medicine for too long. Instead of sub-dividing his patient still further the psychosomatic physician is trying to look at him as a whole and is attempting to correlate the findings of the various specialists. This broadening of the view of illness and insistence on the importance of the psychological factors in the development of disease is a healthy sign, and it is to be hoped that it will continue.

Chapter VII

THE FUTURE OF PSYCHOLOGICAL MEDICINE

As has already been pointed out, Descartes division of man into a material body and an immaterial mind has had a profound effect, not only on medicine, but on all Western thought. Because scientists are specialists in matter they have appropriated the body for study, leaving the care of the mind to the philosophers and the theologians. European thought is predominantly dualistic and although doctors stand aloof from philosophy, they have accepted, and still accept, the division for which Descartes was responsible. In doing so they are aware that it is difficult to explain how an immaterial mind manages to make contact with and affect a material body, but are content to leave the resolution of this difficulty to the philosophers. That the mind does affect the body and the body the mind is obvious; they leave it at that. Descartes explained the working of the human body along purely mechanical lines, and the medical profession has always attempted to do likewise. Materialism and mechanism have thus been stamped on Western thought. Nor has physiology in any way suffered from having accepted materialism and mechanism as a working hypothesis. These two concepts have provided physiologists with an excellent basis for the study of man's body, and it was only when an attempt was made by the behaviourist school of psychology to interpret the mind in a similar way that difficulties arose. The behaviourists got rid of these difficulties by summarily dismissing consciousness as of no importance, but this is an artifice of which few of our modern psychologists will approve.

The allotment of man's body to the doctors and of his mind to the priests proved a serviceable enough arrangement until the former discovered the importance of the mind in the genesis of disease. Since then the arrangement has been no longer workable. Physicians have now realized the necessity of bringing the study of their patients' minds within the orbit of medicine. In spite of the difficulty of bridging the gap between a material body and an immaterial mind the doctors are now attempting to accomplish this arduous feat. They feel that by some means or other the neurologists, endocrinologists and psychologists must manage to make contact with each other, or at any rate to come sufficiently close to each other to confirm each other's findings and give each other aid. Man's mind and his soul—if there be such an entity as the latter—has now to be retrieved from the priests and to be confided to the care of the doctors. Such is the present position.

Whether the doctors are fitted or not to discharge these responsibilities remains to be seen, but there can be no question that it is no longer possible for them to neglect, as they formerly did, the study of their patients' minds. Not only are the mental factors in disease becoming more and more obvious, but there are good reasons for believing that mental troubles are on the increase. The astonishingly high incidence at the present day of various forms of neuroses was revealed during the years of the last war. It is said that a third of the men called to the colours had eventually to be discharged from active service as unfit, on psychiatric grounds alone. As warfare became more intense, involving the fighting of fierce engagements, the casualties from psychiatric causes rose so high as to constitute 75 per cent. of the total man-power wastage. Nor is it only whilst they are being subjected to the special strain of war that modern man becomes a victim of

neuroses. A survey of ill-health among industrial workers show that 10 per cent. of all factory workers suffer from nervous strain of a sufficiently serious nature to prevent them from remaining at work. A further 20 per cent. of factory hands have neurotic troubles which do not prevent them from working, but which are responsible for a great amount of absenteeism. Hospital statistics tell a similar story. It has been estimated that 30 per cent. of all the patients attending the Out Patient departments of our hospitals are in need of psychiatric treatment. So common indeed have psychiatric ailments become that it can be foretold that one out of every thirty children that are born to-day will spend a period of his life in a mental hospital and that one child in every ten to fifteen will suffer from a nervous breakdown after reaching adult age.

Two questions of great importance arise from this high incidence and apparent increase of psychological troubles in the community. The first is: "What is the cause of it?" and the second: "How are the doctors of the future likely to deal with these troubles?" Difficult though it may be to find answers to these questions an attempt must be made to do so.

The cause of the high incidence of psychogenic diseases

It has been suggested that the chief cause of the frequency of mental "breakdown" at the present day is the speed of modern life. The supporters of this theory suggest that the advances made by science have been so rapid and their effect on our mode of living has been so disturbing that our central nervous systems have not yet had time to adapt themselves to them. Now, it is quite possible that inability on the part of our nervous systems to adapt themselves to the abrupt changes in our environment is a factor in the increase of mental ailments,

but it cannot itself explain it. The need for quick reactions, such as those demanded of a pilot flying a jet aeroplane, or of a tennis champion playing on the Centre Court at Wimbledon, is not in itself a cause of mental breakdown. What imposes a far greater strain on people is a conflict between alternative responses, as was clearly shown by Pavlov's experiments on dogs. By evoking simultaneously two responses to which the dog had previously been conditioned, a state of canine neurasthenia was produced.

Another explanation of the high incidence of nervous disorders that has been offered is that it is the result of the feeling of insecurity and anxiety so prevalent at the present day. But was life ever secure for any creature living on this earth? The cave-man also had his fears, and he was far more liable to accident and sudden death than is the man of to-day. All that has changed since the days of the cave-man is that the nature of the prevalent anxieties has altered and that modern man is subjected to a different form of conflict. Instead of worrying himself, as the cave-man probably did, about his ability to find food for his family and to defend them against enemies, the man of to-day is anxious about the state of his bank account and his ability to pay off arrears of income tax. Worry and conflict take many forms, but in their essence they remain for ever the same. No, the speed of modern life is not to be blamed for the rise of mental disorders, for whilst it is true that the human body may find some difficulty in adjusting itself to the experience of travelling at the rate of 400 miles an hour, few of us spend our lives piloting jet-propelled aeroplanes. Nor is there any reason for believing that those whose job it is to travel at this immense speed are particularly prone to nervous breakdowns. Conflict between the different parts of the human mind is a far more potent cause of mental illness.

The human mind is of a very complex nature, embracing as it does the various functions of thought, emotion, movement, sexuality, as well as a number of instinctive urges, all of them working on a low level of consciousness. It is a mistake to imagine that these numerous functions are under the control of an over-riding and permanent "I", or that they are held in a state of nicely adjusted balance. The equilibrium of the mind is so often upset that struggle between its various elements is the rule rather than the exception. The psychoanalysts have drawn attention to the long-drawn-out conflict between the individual's emotional ideals and his sexual drive, but this is only one of the many conflicts within us. The rulings of the head are often at variance with those of the heart and theory is continually at loggerheads with practice. We resemble a house without a master, a house in which each servant does exactly as he likes without reference to the actions or feelings of his fellow servants. Nor is the growth of an infant into an adult the nicely adjusted and orderly process of development that it is in the plant. In one case the life of the intellect develops at the expense of the life of movement, in another the emotions at the expense of the intellect, and in yet a third the instinctive urges are so inhibited by fear of public opinion that they remain permanently suppressed. Modern methods of education would seem to favour these various forms of lopsided development so that the well-balanced type of man is becoming a greater and greater rarity.

The poet Blake arrived at a similar conclusion: that man fails to develop all aspects of his being and he embodied his views symbolically in the Four Zoas. The symbolism of the Four Zoas is a difficult one to decipher, and I am indebted to E. B. Strauss for this illuminating extract from Professor Blackstone's book, *English Blake*: "The Eternal Man who is

'in the beginning' lives ideally in enjoyment of every aspect of his being. Of these aspects four are prominent; the imagination (Los), the reason (Urizen), the passions (Luvah), and the instincts or body (Tharmas). So long as these aspects are held in fluid interplay, all is well. But Man (Albion) is led astray by his passions, and begins to worship them. He permits himself to be dominated by Luvah, and only recovers in time to appeal to Urizen for help. But already the balance of consciousness has been disturbed—the excess in the direction of passion has to be remedied by an excess in the direction of reason. Urizen seizes all power into his hands, banishes Luvah, and initiates the egotistic universe of matter. Tharmas is precipitated in a material form as the ocean, and Los, separating from his emanation Enitharmon (inspiration), is engaged in an eternal struggle from now on to redeem man from the effects of his folly. This involves warfare with Urizen. Man falls into the world of generation, and the phenomenal universe is detached from his body."

Symbolism is the language of the emotions, and Blake's genius has painted here an excellent picture of modern man's dilemma. In the less adequate language of science his conclusions can perhaps be paraphrased as follows: Man's psychological equipment is made up of a number of different elements which should function in harmony with each other so that his beliefs and his actions are the expression of the whole of himself, but modern conditions are so unfavourable to the attainment of this state of inner balance and wholeness, that more often than not, his thoughts and his actions are determined by only a very small part of himself. This lack of wholeness and integration gives rise to inner disharmony and conflict, the strain of which often becomes so great that he breaks down under it. In former days, when Christianity was still a potent

force, men and women possessed an overruling ideal to which they referred all their conflicts, and by which they solved their doubts. But bereft as they now are of spiritual guidance, they are thrown into a state of confusion. Few Westerners to-day have any sense of direction, and that the absence of a sense of purpose in life is conducive to nervous breakdowns is confirmed by Jung. "The psychologist must remember," he writes, "that certain religious convictions, not founded on reason, are a necessity of life for many persons." And again: "It is high time for the clergyman and the psychotherapist to join forces. . . . It seems to me that side by side with the decline of religious life the neuroses grow more noticeably frequent" (C. Jung, *Modern Man in Search of a Soul*).

That the absence of any sense of purpose in life is a predisposing cause of breakdown is also supported by observations made during the late war. At its outbreak many doctors were anxious as to what was likely to happen to their neurotic patients who were only just managing to avoid complete breakdown by dint of much medical attention and frequent periods of rest in nursing-homes. How would such people as these contrive to live without this constant medical attention, and what would happen to them when the bombs began to fall on London? What actually did happen was the reverse of what was expected. The incidence of nervous breakdowns amongst civilians actually dropped in London during the more active phases of the war and many of those who had previously been psychological invalids improved markedly in health. The reason for this improvement was that the war had provided them with what they had previously lacked, an aim in life. Here at last were things worth doing; fire-watching, Red Cross, warden and ambulance work, a host of things to be done, and at the same time an opportunity for regaining the

respect of their fellow men. There were many who took the opportunity suddenly offered them, and with immense gain to themselves. It is not the overburdened man who is so likely to break down as the man who finds that there is nothing worth doing.

So far, environment and upbringing have alone been blamed for the increase of psychological forms of illness, but it is quite likely that a genetic factor contributes to it as well. Modern man has reversed, in his own breeding, the principles which he follows in the stockyard. He breeds from inferior instead of from superior human stock. As will be shown in a later chapter, birth control always works in a direction opposite to that in which natural selection is moving. It reduces the fertility of the better elements in the community and permits the multiplication of its irresponsible members to proceed unchecked. This inevitably leads to racial deterioration, and it is quite possible that deterioration in the quality of the human stock is in part responsible for the increase of mental troubles.

The future of psychological medicine

The second question for which an answer is being sought is the nature of future methods of treatment. How will doctors deal with such troubles in the years to come? One statement on this subject that can be made with confidence is that the gap between the various specialists concerned—namely, the psychologists, the neurologists, the endocrinologists, the biochemists and the physiologists—will be much narrower than it is at the present moment. All of these specialists will be within hailing distance of one another and all will be in a position to give each other help. The endocrinologist will be able to report to the psychologist the endocrine changes in the patient that are associated with his disturbed emotional state—

and the neurologists will also aid him by means of electroencephalograms and other investigations of the central nervous system. It must be borne in mind that endocrinology is still only a few decades old and that although great advances have been made in it, endocrinologists are *still severely handicapped* by their inability to obtain a satisfactory extract of the pituitary. The pituitary is the most important of all the endocrine glands. It has been aptly termed the leader of the endocrine orchestra—in other words, it is the gland which regulates the functioning of all the other ductless glands. One reason for the lack of progress in pituitary therapy is the smallness of that gland, and another the number of different secretions that it is believed to contain. Unlike the thyroid, it has very little storage capacity, and even if it eventually became possible to separate the various constituents of the anterior pituitary gland the amount of hormone so obtained would probably be too small for therapeutic purposes. In the future much more will be known both of the physiology and of the chemistry of this master-gland, and the day may come when the chemist will be able to synthesize its various secretions. Instead of having to rely, as at present, on tedious psychological methods alone, it will then become possible to treat mental disturbances by a combination of psychological and endocrine methods.

The psychiatrist of the future will also receive great help from the biochemist, who by that time will have a more exact knowledge of the subtler chemistry of the body, and will therefore be in a position to aid him both in diagnosis and in the control of his treatment. This treatment will be in part physical and in part mental. Many physical new remedies will be available, of a nature unknown to the doctors of to-day. Advances in knowledge of the physiology and the topography

of the brain will allow also of surgical operations being performed of a far more precise nature than the crude leucotomy operation of to-day. But the earlier diagnosis of mental troubles and the prompt institution of preventive treatment will render recourse to surgery very rare. Advances in physical methods of treatment does not mean that psychological methods will become entirely unnecessary. On the contrary, psychotherapy will be even more in evidence than it is at the present day, and will be more efficient. It is of the psychotherapy of the future that it is now necessary to speak.

The psychotherapy of the future

The Freudian methods, as practised to-day will no longer survive and within a few decades treatment by deep analysis will have been laid aside as unprofitable. When analysis is undertaken, it will be of a superficial nature and usually as a preliminary to other treatment. The Freudian scheme of psychology is likely to be superseded. It has served its purpose and has been a helpful guide to thought, but in the hands of the neo-Freudians it has hardened into a formal and rigid creed. Like a religion that has lost its living essence, it is on the wane, a system of psychology killed, as many religions have been killed, by the formalism of its disciples. But the name of its great founder, Sigmund Freud, will retain its honourable place in the annals of Western psychology.

What system of psychology is likely to replace Freudian psychology? Before attempting to answer this question, it must be remembered that psychology is not a science, or even what it has sometimes been called, "the promise of a science." The only varieties of psychology that can be regarded as being this are behaviourism and the psychology of the laboratory; forms of psychology which are of no practical use in the

treatment of the maladjusted patient. Psychotherapy is an art, and an artist works by intuition rather than by rule of thumb. He is bound to no system, but is a law unto himself. All that the writer of this book is able to say on this subject is that the psychologist of the future is likely to pay far more attention than the psychologist of to-day to the factor of "awareness." Man lives on a low level of consciousness and is rarely aware of his thoughts, feelings, sensations and his movements at the moment of their inception. What is required if he is to gain any control over himself is that he should cease to react blindly to stimuli, but should acquire a heightened awareness of all of his functioning. He must become "self-conscious" in the true and not in the acquired sense of that word. Freud pointed out the benefits to be obtained from dragging up unseen conflicts into the daylight of consciousness, but he placed too strong an emphasis on the past and gave too little attention to the present. We react blindly and automatically to every situation without realizing what we are doing or why we are doing it, in the manner of a somnambulist. Before it is possible to exercise any control over our thoughts and actions, it is necessary to become more fully aware of them. Greater consciousness is a necessary preliminary to greater control.

The only Western system of psychology that has paid attention to this factor of awareness is that of the *Gestalt* school, and in the opinion of the writer it is this system which is the most worthy to survive and to provide a basis for future forms of psychotherapy. A *Gestalt*-therapy is already in existence, and its great advantage is that when its technique has been learnt by the patient, he is able to use it for his own cure and profit. Not only has he acquired the means of ridding himself of the trouble for which he has sought medical aid, but he is enabled to live more wisely in the future.

Dianetics

A new form of psychotherapy known as dianetics has been derived from *Gestalt* psychology. It was evolved in the United States by L. Hubbard, who studied psychoanalysis for eight years and then came to the conclusion that the duration of analysis could be materially reduced by adopting certain short cuts. Hubbard subdivides the human mind into three parts: the analytical mind, the reactive mind and the somatic mind. The analytical mind is a mind filled with precepts, memories and imaginings, and it works continuously, whether we are awake or asleep. It is what we usually call our "rational" mind, and is flexible in character and capable of guiding our behaviour in all ordinary, non-emergency situations. The reactive mind is the mind which comes into action abruptly and takes over complete and uncritical control in moments of emergency and stress. In Hubbard's words, "the nearer the individual approaches unconsciousness and death, the more completely the reactive mind controls him." It records the perceptions made during these periods of great stress, and the memories of these are known to the dianeticist as "engrams." These engrams include all the sensations, the pain and the unpleasant emotions experienced at these times of stress. The memory of them is suppressed by the functioning of the analytical mind, but should the individual happen to find himself in a situation which in any way resembles that which existed at the time of the making of the engram, he reacts to it precisely as he did before. His reactive mind immediately assumes control and his analytical mind falls into abeyance. Nor is it essential that the new situation should resemble very closely the previous one in order that the old responses may be reactivated. The similarity need only be a superficial one

for the engram to be "keyed in." "It is the reactivation of engrams," writes D. O'Connell, "which causes fixed behaviour patterns and psychosomatic disorders. The more an engram is restimulated, the more highly-charged will it become and the greater will be its power to aberrate."

This, according to the practitioner of dianetics, is the mechanism which controls us, and the device which is responsible for the aberrated behaviour of the neurotic. How does the dianeticist proceed to deal with it? At first sight his treatment appears to be similar to that of the Freudian, but on closer examination the resemblance is seen to be only a superficial one. L. R. Hubbard describes the aim of what is known as the "dianetic reverie" as follows: "The aberrative effect of these engrams can be removed if the individual is returned to the moment of the occurrence and can recall the engram in perfect detail, while fully conscious, and recount it several times. In this way, perceptions and sensations which were not previously available to the analytical function become available, and are open to adequate analytical interpretation and evaluation by the individual. Thus they will no longer be interpreted by the individual as signs of an emergency situation and will no longer have the power to awaken the reactive mind to emergency behaviour" (L. R. Hubbard, *Dianetics*).

The dianetic reverie

The method of recalling and of reinterpreting the compulsive engram is as follows: The patient sits on a comfortable chair or reclines on a couch, and when he has become relaxed he is asked to recall some emergency or distressful moment in his life, or perhaps to revive his first experience of the somatic complaint from which he is now suffering. Having recalled such a moment of stress, he is made to relive it. He is told to

reawaken in himself the distress which he felt at that time, the sensations which reached him from his body, the movements he made, the position of his limbs, his fears and his emotions, and his reactions to the people around him. In a word, he is encouraged to experience again everything that was happening to him at that moment of time. The patient does this recalling and re-experiencing himself, and care is exercised not to suggest anything to him. All that the auditor (the name given to the expert supervising the reverie) does is to put to him questions calculated to help him revive every detail of the scene. "What do you see? What do you hear? Are you aware of the feelings of those around you? What sensations reach you from your body? What prevents you from expressing what you feel?" These are the kinds of questions asked by the auditor.

Great importance is attached by the dianetic expert to this fact that the patient is the active agent in the whole proceeding, that it is he who is treating himself. In order to avoid the idea of a passive patient being treated by an active doctor, the words "patient" and "doctor" have been replaced by the terms "pre-clear" and "auditor." By a "pre-clear" is meant an ordinary man who has not yet been sufficiently cleared of his engrams to be aware of his motivations and by "auditor" is meant an expert in the technique of dianetics. It is regarded of great importance that the "pre-clear" should become aware of his inner feelings and attitudes by his own efforts alone, not merely by remembering them, but by re-experiencing them.

Dianetics is a new psychological adventure and there was much in it that commended it at first to the author. One great advantage was that it provided a technique by which the individual could discover some of the hidden mechanisms of his own behaviour, and perhaps—but this is a distant aim—a means

by which he might eventually learn to control these mechanisms. Once he had learnt the technique of "dianetic reverie," a professional auditor was no longer necessary to him, and he could continue to use the method on his own, with the help, perhaps, of a friend, husband or wife. The other reason why dianetics commends itself to the author was that it looked upon all mankind as living on a level of consciousness below that on which it has the right to live. But unfortunately there is a great danger that what began so well will end in chaos and ruin. Extravagant claims are now being made for dianetics, and its originator is evolving a whole system of cosmology of a fantastic nature. There are ominous signs that a movement which in its earlier stages showed great promise will be brought to an untimely end by the exuberance and uncritical attitude of its exponents.

Chapter VIII

THE PHYSICIAN OF THE FUTURE

IN the last few chapters a bird's-eye view was given of the whole field of medicine. It was seen to be divided up into an ever-increasing number of smaller and smaller holdings, or allotments, and the people working in them were noted to be so engrossed in their own work that they made very little contact with one another. It was recognized that specialization was a process which was occurring in every other field of human thought. Whenever there is a rapid advance of knowledge there comes a time when no one person can claim to be master of it all and a process of dividing it up begins. The process of division gathers force and more and more specialties appear. This has long been happening in medicine and by now so much medical information has been collected that what is required above all else is that the litter of knowledge should be carefully scrutinized. It must be put in order and certain general principles derived from it. In other words, medicine awaits its Isaac Newton.

How is this work of synthesis to be brought about? It was seen in the last chapter that an effort is already being made to draw together the findings of the physician and the psychiatrist. Although little progress has as yet been made, it is an indication that this great work has started. There are other signs that the medical profession is realizing the need for a closer contact between its different kinds of experts. One indication of this is that many of the articles now appearing in the *Lancet* and in other medical journals are written by a group of specialists—

for example, by a physician, a biochemist and a pathologist. These joint papers are a favourable sign, and it is to be hoped that they will become even commoner.

It is to the general physician in particular that we must look for help in this important work of correlating the findings of the different specialists, for the physician is the undoubted leader of the medical profession. He fully merits this position, and for several reasons. The first is that his field of vision is of necessity a very wide one, which embraces not only the whole of the patient's body, but also his mind. Another reason why the physician should take precedence of the surgeon and of the specialists is that finer qualities are demanded of him and the general practitioner than of any other kind of doctor. He must be endowed with gifts far rarer than medical knowledge or manual skill—namely understanding and wisdom. That remarkable medieval physician, Phillipus Theophrastus Bombast, usually known as Paracelsus (1493-1551), wrote of the requirements of the physician as follows:

"The greatest and highest of all qualifications which a physician can possess is Sapiientia and without this qualification all his learning will amount to little or nothing, so far as any benefit or usefulness to humanity is concerned. He alone is in possession of wisdom who is in possession of reason and knows how to use it without error or doubt. . . . We cannot find wisdom in a book nor in any external thing; we can only find it within ourselves. . . . A physician must seek for his knowledge and power within the divine spirit; if he seeks it in external things he will be a pseudo-medicus and an ignoramus. . . . A physician should exercise his art not for his own benefit but for the sake of his patient" (F. Hartman, *Life of Paracelsus*, 1948).

His methods of treating disease

The next question to be discussed is how the physician of the future is likely to differ from the physician of to-day. He is unlikely to differ much in character but he will possess a superior professional equipment. He will have better methods of diagnosis and treatment and new ways of dealing with disease with which we are completely unfamiliar to-day. Yet there is no guarantee that the general physician will manage to survive the crisis through which medicine is now passing. It is possible that he may be compelled to adopt some specialty in the field of general medicine, and thus cease to be what he now is, a man who looks upon his patient as an indivisible whole. But it will be assumed that the physician does manage to survive.

The best means of foretelling what kind of remedies the physician of the future will employ is to discuss some of the important medical discoveries of recent years and to see how they are likely to develop. The synthesis of specifics by the chemists is a suitable subject with which to begin.

Chemiotherapy

No partnership has proved more profitable to medicine than that which began between doctors and chemists some forty years ago with Ehrlich's discovery of salvarsan. It is to the joint work of these two kinds of experts that we now owe the sulphonamide, or M. and B., drugs, which came into general use shortly before the outbreak of the war. No medical advance could have been more opportune than this one, for it provided a valuable means of combating sepsis just at the time that this was urgently needed. It is no exaggeration to say that many thousands of men alive to-day owe their lives and

their limbs to these sulphonamide preparations. Nor was it only in the combating of the wound infection that this partnership between the chemists and the doctors gave opportune help. By good fortune, advances had also been made in the synthesis of drugs having a specific action on protozoal diseases, and thanks to this a catastrophe which would otherwise have brought disaster on our Eastern forces—namely, the capture by the Japanese of the world's quinine supply—was averted. Actually the sudden scarcity of quinine proved a boon to medicine. It stimulated a still more intensive research and led to the discovery of such valuable new anti-malarial drugs as mepacrine, pamaquin and, at a somewhat later date, paludrine. It is no reflection on the ability of the Eastern Command to say that the Burmese campaign was won by the chemists and doctors engaged in this research rather than by the general staff.

The chemist's search for specifics will continue, and we can be confident that many new potent remedies will be found. It is to be hoped that amongst these will be specifics for infections which have hitherto repelled all forms of chemical attack on them. The bacillus of tuberculosis is one of the organisms that has not yet been conquered by means of drugs, probably because it is encased in a protective envelope of fat which our chemical bullets are unable to pierce. But there is no reason why a suitable projectile should not eventually be found so that the tubercle bacillus can be added to the list of the conquered. Whether cancer will also yield to this kind of warfare is much more doubtful. In spite of the immense amount of research done on the subject of cancer, its cause is still unknown. It is quite possible that it is due to virus infection, and so far the viruses have proved remarkably resistant to chemical warfare. It is equally possible that cancer has little to do with

infection, but that this disease will eventually be conquered I have little doubt. Whether a cure for cancer will be to humanity's advantage or not is questionable, for, as will be seen in a later chapter, the solution of one medical problem often gives rise to new problems of a still more difficult nature.

Because the viruses have resisted our efforts to destroy them by chemical means, doctors are still in the ignominious position of not being able to prescribe any treatment for the ordinary cold. It is to be hoped that the physician of the future will have effaced this disgrace, for, trifling though the common cold may be, it is a great nuisance and the cause of a great deal of absenteeism.

Antibiotics

Sir Alexander Fleming's discovery of penicillin in 1938 was of even greater importance than the discovery of the sulphonamide drugs. Not only did it give us an exceedingly valuable new remedy, but it introduced an entirely new method into the practice of medicine—that of conquering one hostile organism with the aid of another. The story of the discovery of penicillin is well known, but it is of such general interest that it bears repetition. One day in 1938, during the course of a cool and damp summer, a spore of a mould called *Penicillium notatum* floated through the window of Dr. Fleming's laboratory at St. Mary's Hospital, near Paddington Station. It was fortunate enough to alight on an agar plate on which *Staphylococcus aureus*, the golden micro-organism responsible for boils, was growing. When examining the contaminated plate a day or two later, Fleming was struck by the fact that no colonies of *Staphylococcus aureus* had succeeded in establishing themselves in the area of the mould. Because he possessed the insatiable

curiosity of the scientist and was moreover particularly interested in the subject of anti-bacterial substances, he made cultures of the mould which had spoilt his agar plate. It was from these original cultures that the immense quantities of penicillin used subsequently during the world war were derived.

Organic life on the earth

The vagrant spore of *Penicillium notatum* which floated through the Paddington window and was fortunate enough to alight on an insufficiently protected culture dish, did much more than supply the allied armies with a powerful remedy against wound infection. It opened a new chapter in the history of medicine and to understand this the subject of life on the earth must first be discussed.

Organic life on the surface of this planet forms a great whole in the same sense that the innumerable cells of the human body form a great whole. The comparison of organic life with the human body is an apt one, for the various forms of life on the earth are mutually dependent on each other and a balance is maintained between them just as a balance is maintained between the various cells of our bodies. How this balance between the various forms of life is preserved is a very interesting question, but all that concerns us now is the balance held between two of them, the pathogenic organisms and mankind. It is a fairly stable one, but from time to time one of these rival competitors for survival gains a temporary ascendancy over the other. If it be man who is in the ascendent, he improves in health and the hostile organisms are reduced in numbers, but if it be the pathogenic organisms that gain the upper hand, an epidemic occurs. The epidemiologists are engaged in studying the factors responsible for a swing of the

scales in favour of the hostile organisms, and it is part of their work to give advice as to what measures should be adopted to counteract it.

Sir Alexander Fleming's discovery showed us that we had potential allies within organic life whose help could be enlisted in our struggle against infective organisms. It proved to us that the moulds were their hereditary enemies and showed us how these new allies could aid us. Of the help we have already had from these humble friends of ours in organic life it is unnecessary to speak, for it is well known to everybody. It is of the future and of the new allies that we are likely to find in organic life that alone need be discussed.

It must be remembered that penicillin is by no means a panacea against every form of infection, but that it is highly selective in its action. It destroys only a few of the organisms which attack us and is powerless against others. Because of its limited action, an intensive search was immediately begun for other moulds capable of destroying organisms on which penicillin had no effect. Already several new allies have been discovered, such as streptomycin, chloromycetin, aureomycin, terramycin, etc. The breadth of our attack has thereby been considerably enlarged, and there is every reason to suppose that our front will be extended still further in the near future. But alas! the viruses which proved so resistant to the sulphonamide drugs are putting up a strong defence against these moulds. It is ironical that the smallest enemies of mankind, so tiny that they cannot be seen under the microscope, are proving so formidable. They are not only minute, but are so low in the scale of life that biologists are still disputing whether they are actually alive or whether they should not be classified amongst the ferments. Yet they are almost as successful in this new kind of biological warfare as they were previously

successful against chemical attack. But in spite of the fact that medicine has so far failed to find a really effective remedy against viruses, there is no need to despair of our ultimate victory over them. When that victory has been won, such diseases as poliomyelitis, whooping cough, smallpox and influenza (and, in the veterinary world, foot-and-mouth disease) will disappear and hospitals at present used for the treatment of the contagious fevers will become available for other purposes. Yet mankind has not been able to carry war into the enemy's camp without the adoption of counter-measures on its part. It was long ago noted that strains of organisms resistant to the sulphonamide drugs and to the antibiotics were becoming much commoner. The appearance of these resistant strains was first observed when infections were being treated with sulpha drugs, and it is again being observed now that they are being treated with antibiotics. These strategic moves of the enemy have stimulated search, both for new types of sulpha drugs and for new varieties of moulds, a search which from time to time brings new allies to our aid. And so this process of attack and counter-attack is likely to continue, but with humanity slowly gaining ground.

Advances in endocrine- and vitamin-therapy

Hormones and vitamins have much in common, and one of the qualities they share is the profound effect that a very small quantity of either of them has on the working of the body. What distinguishes them is that whereas the body is able to manufacture its own hormones, it is dependent on food for its supply of vitamins. Great progress has been made in our knowledge of both of these substances and here again the chemists have been of great assistance to the doctors, first by their determination of their chemical composition, and then

by synthesizing many of them in their laboratories. The manufacture of insulin is probably the best known of these synthetic achievements, and there is every reason to believe that many advances of equal importance to this will be made in the near future. As was said in the previous chapter, the advance that will be of the greatest utility to the physicians of the future will be the synthesizing of the pituitary hormones. It will be of great value because three structures, the pituitary gland, the great masses of grey matter lying at the base of the brain and the sympathetic system are key structures in the emotional life of man. They form a sort of no-man's-land between the adjoining territories of the physician and of the psychiatrist. It is here that these two experts will eventually meet, the former to give his advice as to general and hormonal treatment, and the latter to report on the effect that this treatment is having on the patient's psychological state. It may occasionally be necessary to the physician to enlist the help of another expert in order that he may deal with some special aspect of the general psychosomatic problem, but only in very exceptional cases will a surgeon be summoned. For the calling in of a surgeon must always be regarded as a sign of failure on the part of those who have been previously responsible for a patient's treatment.

At the present day the surgeon's services are often needed. They may be required, for example, in the treatment of endocrine disturbance caused by such psychosomatic diseases as exophthalmic goitre. This type of goitre causes hyperthyroidism (an excess of thyroid secretion) and marked changes in the patient's psychological state. The patient, who is almost always a woman, becomes highly apprehensive and emotional, and a severe nervous shock may act as a precipitating cause of the disease. Physical and psychological events are so closely interwoven in this disease that it is often impossible to say

which is the cause and which is the effect. Treatment is directed to the reduction of the activity of the thyroid and should the physician fail to bring this about by eliminating sepsis—a potent factor in exophthalmic goitre—and by treating the patient with a preparation called thiouracil, he must enlist the aid either of a surgeon, or of an expert in deep X-ray therapy. The former reduces the output of thyroid secretion by removing a large portion of the gland and the latter by means of X-rays. Collaboration of this kind between the physician, surgeon and physiotherapist will be much commoner in the future and if the surgeon is eventually able to graft whole organs on to the body, his utility to the physician will be still further increased. He will then be in a position to supply what it lacking as well as to remove what is superfluous. And if, as is likely, the physiotherapists of the future possess new forms of radiations unknown to the physiotherapist of to-day, his sphere of action will also be extended. Medicine is just beginning to profit from the recent spectacular advances in nuclear physics, and it is likely that the collaboration between the doctor and the physicist will prove as profitable in the future as the collaboration between the doctor and the chemist has proved profitable in the past. This partnership has already begun.

The use of isotopes in medicine

It is a comforting thought that present-day physicists are contributing to advances in medicine as well as to advances in the science of destruction. The transmutation of elements can now be brought about by means of comparatively small atomic piles, and this means that isotopes of a great many different elements are available for medical research. These isotopes are now being used by the physiologists as “tracers.” They provide a means of studying bodily processes, and with

their help much light has been thrown on the physiology of various organs. For example, doctors are now able to trace the course taken by the element iron after its absorption from the intestines into the bloodstream. The isotopes of iron, Fe 59 and Fe 55, behave in exactly the same way as does the usual form of iron, Fe 56, which is given to patients suffering from anæmia. But the isotopes Fe 59 and Fe 55 differ from Fe 56 by being radioactive, and this means that the course they take in the body after being swallowed can be followed by means of a Geiger counter, an instrument used for the detection of radiations. All that it is necessary to do in order to discover the whereabouts of the swallowed radioactive iron is to bring the counter into proximity with various parts of the patient's body and to note where it begins to click. So also has the radioactive form of sodium chloride, or common salt, been used for determining the speed with which salt is distributed throughout the body and also as a means of measuring the volume of lymph in certain organs. By following the course taken by radioactive carbon, nitrogen and phosphorus after they have been taken into the body, valuable information has also been obtained of the parts they play in the body's chemistry. What is of still greater importance to the doctor is that the chemistry of tumours can be studied in a similar way. Yet another interesting fact has been elicited by this method of study—namely, that the tissues are replaced at an astonishing rate. It is now believed that every molecule in our body is replaced by a new one within a period of ten years. In other words, we are completely rebuilt every ten years of our lives, a fact which gives rise to a new set of problems, and amongst others the problem of memory. If we are entirely reconstituted every ten years how is it that we are able to recall what happened to us twenty years ago? Hitherto physiologists have

believed that memory impressions are recorded in the cells of our cerebral hemispheres. But if these recording cells have been replaced, how do we manage to recall our childhood?

Electrical and radiation phenomena of the living body

Medical men have learnt a great deal about the physiology of the various organs from the study of the "currents of action." For example, the currents of action of the heart and the brain, as recorded in cardiograms and encephalograms, are used for diagnostic purposes. By comparing the tracings obtained in illness with those obtained in health experts are able to discover the state of these organs and to give an opinion concerning the prospect of future recovery. Other electrical phenomena are also being studied. There are reasons for believing that the body gives off radiations in addition to developing currents of action. These radiations are very difficult to study. Not only are very sensitive instruments required for their detection, but, what is much more difficult to overcome, radiations and magnetic disturbances from elsewhere affect their readings. Even so small a thing as a change in the weather will affect the instruments and lead to the readings being misinterpreted. But that the body is an electro-magnetic field and that it gives off its own characteristic radiations there can be little doubt. Some animals emit radiations which can be detected without the aid of any instrument at all. Luminiferous organisms such as the glow-worm and the firefly are examples of this. So also is that tiny creature known as *Noctula miliaris*, the organism to the presence of which is due the phosphorescence of tropical seas, another instance of life giving off visible radiations.

Lakhovsky, a Russian physicist working in Paris, has gone so far as to define life, entirely in terms of its radiations. He

describes it as "a dynamic equilibrium of cells, a harmony of radiations which react upon one another" (Lakhovsky, *The Secret of Life*). He regards every cell in the body as being an electric generator, and in support of this thesis he calls attention to the similarity of the coiled filament of the cell's nucleus to an electric coil. The filament of the cell's nucleus is composed of a central conducting core covered by an insulating sheath of dielectric substances (cholesterol, plastin, etc.). If it be true that the human body is a generator of electric energy and emits radiations, it would not be in the least surprising if these underwent a change during ill-health. It is already known that a serious mental illness, such as epilepsy, is associated with an alteration in the brain's currents of action and it is quite likely that other forms of illness produce changes in the electrical patterns of the body.

Should further clinical and experimental investigations prove this to be the case, then it would be reasonable to treat illnesses with some form of corrective radiation in the hope of restoring a healthy pattern. Lakhovsky describes experiments of this nature which were carried out in the Salpêtrière Hospital in 1924. It has long been known that cancer-like growths can be produced in plants by inoculating them with a certain bacillus (*Bacterium tumefaciens*). A number of geranium plants were inoculated with this organism, and in due course they developed, characteristic white tumours, the size of cherries. Two weeks later these tumours were treated with radiations of a known wave-length. After treatment the tumours still continued to grow for about two weeks, and then they suddenly became necrotic, so that they could be peeled off from the stems. The untreated tumours continued to grow as before, and eventually killed the plants.

Future developments in wave-therapy

During the last thirty years a great number of radiation treatments have been used in medicine. Patients have been treated with light rays of different wave-lengths, ranging from the infra-red to the ultra-violet, with both hard and soft X-rays, with radium radiations and emanations, and with various forms of electric waves, including short-wave diathermy. All of these forms of treatment have proved useful, and it is likely that many new types of wave-therapy will be introduced into medicine in the years to come. At the present moment a widespread interest is being shown in this subject, both within and outside the medical profession. Now, it is quite true that "vibrations" and "radiations" are words much favoured by the charlatan and the medical adventurer, and it is equally true that many irresponsible statements are being made on the subject of radiations. But it would be foolish to dismiss the whole subject merely on the grounds that ridiculous claims are being made for such methods. The charlatan is often the forerunner of a new medical advance, as the history of medicine clearly shows. As has already been stated, Mesmer flourished magnets, made magical passes, dressed himself as a magician and thoroughly scandalized the orthodox doctors of Paris by his behaviour, but he rather than Charcot, Janet or Freud must be regarded as being the father of modern psychological medicine. Erratic and irresponsible though some of these new practitioners of radiation-therapy may be, their methods and their claims must be submitted to scientific scrutiny. The majority of them are sincerely convinced of the importance of their work, and it is difficult for a man to remain deluded for many years unless he occasionally obtains results which support his views. But whether these enthusiasts of to-day are self-deluded men or not, I am of the opinion that new forms of

radiation-therapy will be an important part of the future physician's equipment.

I do not base this belief on any results already obtained from radio-therapy, but on the general nature of the universe as I see it. Matter and energy are now regarded as one, and, this being so, it would be more logical to look upon the universe as a vast field of radiations rather than, as we formerly looked upon it, as empty space in which a number of suns are moving about. If this be true of the universe as a whole, it is equally true of everything that the universe contains, including us living creatures. Looked at from this view-point, each of us is a magnetic field, or, it would be more correct to say, a collection of magnetic fields. We can regard ourselves as being parcels of energies or net-works of vibrations. Everything within us is in a state of movement, and if our hearing were acute enough we would be able to detect the sound waves set in motion by our various organs. Nor is this a new and entirely fantastic notion. The eminent seventeenth-century physicist, Robert Hooke, wrote that "it may be possible to discover the motions of the internal parts of bodies, whether animal, vegetable or mineral by the sounds they make; that one may discuss the works performed in the several offices and shops of a man's body, and thereby discover what instrument or engine is out of order, what works are going on at several times; and lie still at others and the like; that in plants and vegetables one might discover by the noise of the pumps for raising juice, the valves for stopping it, and the rushing of it out of one passage to another and the like." Let it be borne in mind that the writer of these words was not a poet, but a hard-headed scientist. If we picture man's body, as Robert Hooke has done, in terms of sound, why should we not picture it in terms of electromagnetic waves or of the other radiations of which the universe

is composed. Let us go further and allow the imagination even more liberty than we have already accorded it. Let us imagine that a means has been discovered by which this interplay of vibrations can be rendered visible to the eye as the currents of action of the beating heart have been rendered visible to the cardiologist by means of the electro-cardiograph. If we were to make use of this hypothetical instrument, we would be likely to find that the pattern made by the body's vibrations differed in health and in illness. We would become aware of the disharmonies of disease, of dissonance coming perhaps from the region of the liver, of a note which sounded a discord with the vibrations coming from organs. Finally, it would not be surprising if we managed to correct this discordant working, say, of the liver by treating it with vibrations of another frequency and wave-length. I am aware that many of my colleagues will dismiss this as a flight of poetic imagination, but much can be said in favour of the view I have put forward that new forms of physiotherapy will play a very important part in the medicine of the future. These developments that I have imagined will not only be of value in treatment; they will be of equal assistance to diagnosis in the earliest stages of illness. As the first half of this century has been remarkable for the excellence of the results obtained from a collaboration between the doctors and the chemists, so, in my opinion, will its second half be remarkable for the advances made by the joint work of doctors and physicists. This at any rate is how the writer of this book sees the future.

The future of the physician and the general practitioner

Summarizing this chapter, it may be said that if the general physician manages to survive—as I expect him to do—he will not be a very different person from the physician of to-day,

but he will be in possession of a great many valuable new methods of diagnosis and treatment. He and his colleague, the general practitioner, will act as the co-ordinating agents to the medical profession, their medical knowledge being sufficiently wide to allow of their interpreting the reports made by the various specialists. But it is quite possible that the general physician will have to carry on this work alone for the general practitioner is so rapidly being transformed into a State official that he may not survive. That the National Health Services Act is a stepping-stone to the establishment of a complete State medical service I have little doubt. It is difficult to arrest a general movement once it has started, and it is obvious that everything is flowing in the direction of State management and ownership. What we cannot remedy, we must accept, and the best hope for the future would appear to be that the consulting physician and the more highly qualified type of general practitioner should manage to survive the crisis through which the medical profession is passing. Their function will be to act as the agents by which the activities of the various departments of the healing art are co-ordinated, so that the patient may be treated, not as a collection of organs or systems of organs, but as an indivisible man.

The general practitioner himself is fully aware of the danger which threatens him. He realizes that the National Health Services Act has already had the effect of lowering the general level of medical practice and knows that the introduction of a State medical service will lead to his disappearance. The better qualified type of medical student now shows a strong disinclination to go into general practice and chooses instead to qualify as a specialist. He appreciates the fact that in general practice his main aim will become that of collecting as large a panel as possible, made up of patients requiring a minimum of medical attention. So the number of would-be specialists is

growing and that of potential practioners is on the decline.

In order to combat this swing away from general practice, steps are being taken to raise the practitioner's professional standing and to improve the quality of his work. The most important of these is the proposal to found a College of General Practice, the duties of which will be as follows:

(1) To provide practitioners with academic headquarters which will supplement rather than compete with the functions of the universities and Royal Colleges.

(2) To give leadership to the general practitioners and to speak authoritatively on their behalf.

(3) To co-ordinate the work of the various committees dealing with matters concerned with general practice.

(4) To assist in undergraduate training and to promote and encourage research in general practice.

(5) To do everything possible to improve the status and prestige of the general practitioner.

It is hoped also that the education of the student of the future will include instruction in the special problems to be met with in general practice and that hospital beds will be provided in which practitioners can treat their own cases, assisted when necessary by specialists. Another proposal is that the new college will grant a higher degree or diploma to those engaged in general practice.

These efforts on the part of general practitioners both to prevent the deterioration of the quality of their work and their own disappearance into the machinery of the State are to be encouraged, and the whole of the future of medicine may depend on whether they are successful or not.*

* Since these works were written the College of General Practice has actually come into being and its birth has been welcomed by the vast majority of the medical profession.

Chapter IX

THE SURGERY OF THE PAST AND THE PRESENT

WHEN we of the twentieth century think of surgery a vision comes into our minds of a beautifully equipped operating theatre with tiled walls, a tessellated floor, high-powered lights and nickel-plated fittings. We picture a number of white-robed, masked figures bending over a human form, almost completely hidden by sterilized towels and stretched out on a brightly illuminated table. An operation is about to begin in which the surgeon, his assistants and the nursing staff will work together as a highly skilled team. So well has it been trained that only a few words will have to be spoken throughout the whole of a very complicated proceeding.

"Raise the table. Thank you, that's enough. Can I start?"

The anæsthetist nods and the preliminary incision is made. The assistant sponges away the small amount of blood that exudes from the wound, applies artery forceps to a bleeding point and the operation is continued.

"Small, round-bodied, curved needle, please, and No. 2 catgut."

The theatre sister hands the surgeon what is required and with the exchange of a nod and an occasional word the operation is brought to an end. Dressings and bandages are applied, the theatre porters are summoned, the patient is lifted carefully from the table and wheeled away, to be replaced in ten minutes by another one. And so the work continues, with perhaps twenty minutes' break for tea, throughout the whole of the afternoon. So quietly is everything carried out, so

smoothly does the routine of the theatre run, that it would seem that these people are discharging a task of a far less serious nature than that on which they are actually engaged. Yet moments occur during the afternoon when the atmosphere in the theatre becomes more tense, when the surgeon exchanges an anxious glance with his anæsthetist, questions him about the state of the patient's pulse, sends word perhaps that a transfusion will be required on the patient's return to the ward and increases slightly the speed with which he completes the final stages of the operation. Unlike the motor mechanic, he is working with a delicate material known as "life," and life is in a state of unstable equilibrium that is readily upset. The unexpected may lurk behind the next step in the operation, and the patient's safety can never be taken for granted.

We are of course fully aware of the fact that surgeons plied a much cruder form of their art before Lister discovered the importance of antiseptic methods and long before anæsthetics were used, but we are inclined to think that surgery in the true sense of the word is of comparatively modern origin. This is far from being the case. Surgery is one of the oldest, if not actually the oldest, of all the healing arts, as old indeed as are war, violence and accident. The first human cry of pain was a cry for surgical aid, and men of the Stone Age were forced to find some means of dealing with injuries inflicted by enemies or resulting from accident. Experience had taught them that broken limbs must be kept at rest and that open wounds should be dressed with bark, curative leaves or salves made out of the fat of animals. Surgery is so ancient that it is impossible to say when it began. We can safely put it back into the Stone Age and assume that the first surgeons were men, or more probably women, who had acquired a local reputation for looking after

hunters who had been injured in the chase or wounded by enemies.

Records of surgical operations, and of operations of a very complicated nature, are to be found in two ancient writings, the *Rig Veda* (1500 B.C.) and the *Papyrus Ebers* (? 2000 B.C.). At that time mutilations of the nose were often deliberately inflicted as a punishment, and both the *Rig Veda* and the *Papyrus Ebers* describe methods of dealing with these mutilations. In Ancient India loss of the nose was considered to be the right treatment for unchastity on the part of a wife, and in the *Rig Veda* a method is described of turning down a flap of skin from the forehead and fixing it so that it covered the disfigurement left by the punishment. It was a proceeding based on the same surgical principles as those followed at the present day. An operation on the nose of this kind is still referred to as the Indian method of rhinoplasty. So plastic surgery is not what some people believe it to be, a modern invention, but one of the oldest forms of surgery. As it is obviously impossible to discuss in this book the great variety of operations now being performed, plastic or reconstructive, surgery will be taken as an example of the surgeon's art. But first it will be necessary to deal with some of the difficulties which had to be overcome before surgery could reach its present state of perfection. The most serious of the obstacles to its progress were pain, sepsis, hæmorrhage and shock.

Pain

Pain is nature's alarm, her brusque method of calling our attention to the fact that something is amiss with our bodies. But as has already been said, her signal of distress is sometimes unduly prolonged, so that it continues to sound long after the sick man is fully aware of his illness or his injury. The first

duty of the surgeon may therefore be to relieve a patient of his pain. After attention has been focussed on the fact that something is amiss, pain becomes the enemy of the surgeon as well as the enemy of the patient, for it is an obstacle to the exercise of his art. Because of it he may be unable to persist long enough to find the right alignment for a broken bone, for no doctor enjoys the role of torturer. Pain was a formidable obstacle to surgeons in pre-anæsthetic days. A certain Dr. Greenhill wrote of the strain imposed on surgeons who were compelled to inflict agonizing pain on their patients. He records how the great John Hunter "turned pale as death" whenever he used the knife, and how both Abernethy and Sir Charles Bell "could never think of an operation without heart sickness." It was only their conviction that it was their professional duty to overcome their own feelings that enabled such men as these to face the horrors of the operating theatre.

Before the discovery of anæsthetics, all that could be done to relieve a patient of pain was to stupefy him with sedatives and soporifics. Pain-relieving drugs were obtained from such plants as hellebore, mandrake, hemlock and henbane, and were used either as soothing local applications or else as anodynes to be taken by mouth. Wine was given for the same purpose, but opium is the most ancient and also the most efficient of the sedatives and soporifics. It was used by the doctors of ancient Greece and Rome, and in his writings Discorides, a Greek physician of the first century, who worked as a military surgeon in Nero's army, refers to opium as "a pain-easer and a sleep-causer." Hemp, or *Cannabis indica*, was favoured in ancient India, but it had the disadvantage that its action was less certain than that of opium. It is surprising that although ancient and medieval doctors made considerable use of soporifics in their medical practices, they seldom employed

them to mitigate the pain of surgical operations. The reason for this was that the risk of an overdose was considered to be too great to allow of their being used. So strong was this belief that when a seventeenth-century barber-surgeon of Troyes, by name Nicolas Bailly, administered a narcotic potion to his patient before operating on him, he was arrested afterwards and tried for witchcraft. At that time it was illegal in France to stupefy patients with drugs before operating on them.

Cruder and much less efficient methods of stupefying a patient were considered justifiable. The pleasantest of the alternatives to sedative drugs was to make the patient drunk before he was placed on the operating table, and the most unpleasant to throttle him by compressing his carotid arteries. At a later date surgeons hit upon the plan of producing a local anæsthesia by compressing the nerves supplying the area on which the operation was to be performed. This was done by applying a very tight tourniquet, but the method had the disadvantage that it could only be used in the case of operations on limbs. The great John Hunter suggested as an alternative to this compression method, the reduction of local sensibility by the application of extreme cold. But there were practical difficulties in producing the necessary degree of cold, and his proposal was never acted upon. Then, as so often happens in medicine, a fortunate accident occurred in another department of science which diverted the search for anæsthetics in an entirely new direction. Sir Humphry Davy, the famous physicist whose name is known chiefly because he was the discoverer of the miner's lamp, had a bad attack of toothache and he noted that whenever he inhaled the fumes of nitrous oxide, a gas with which he happened to be experimenting, his pain was relieved. Another man might have been satisfied with

this relief and have thought no more about it, but Sir Humphry was a scientist, and, moreover, a scientist possessed of a very alert mind. "If," he said to himself, "this gas relieves my toothache, why should it not be used to relieve other forms of pain?" He brought the matter to the notice of the medical profession and a number of experiments were made by himself and his friends on the properties of "laughing gas." Nitrous oxide was given this name on account of the fact that the experimenters often laughed heartily while "coming round" from it. As nitrous oxide is still being used in surgery, Sir Humphry Davy can be regarded as being the grandfather of anæsthesia.

The discovery of laughing gas naturally led to experimentation with other types of gases, and Michael Faraday, Sir Humphry Davy's still more famous pupil, tried the effect of inhaling the vapour given off by ether. He administered it also to animals and found that he could render them completely unconscious by this means. Afterwards he made experiments on human beings, but he came to the conclusion that it was too dangerous a method to use and ceased to be interested in it. Others were prepared to take the risk that Michael Faraday considered to be too great, and the scene now shifts to America, where a number of men, C. W. Long, Horace Wells, Charles Jackson and William Morton, continued to experiment with ether vapour. To the last of these men must be accredited the honour of being the world's first anæsthetist. On October 16th, 1846, Morton succeeded in keeping a patient unconscious by means of ether vapour whilst a surgeon carried out on him a completely painless operation. The doctors present on this historic occasion must have been mightily relieved when their patient returned safely to consciousness at the end of the operation. They probably congratulated each other on

the successful issue to their adventurous experiment, but it is unlikely that any of them fully realized the magnitude of the event that they had just witnessed. They little guessed the tremendous effect that it was destined to have on the whole future of surgery.

The idea of anæsthetics was very much in the air during the first half of the nineteenth century, and just as the inhalation of small quantities of laughing gas had for a time been a kind of parlour game in certain circles in England, so in Edinburgh did a Dr. James Simpson and some of his friends meet periodically in order to test on themselves the effect of inhaling vapours. At first none of the vapours they tried gave any interesting results, but eventually Dr. Simpson received from a Liverpool chemist a sample of a heavy, sweet-smelling colourless liquid resembling ether. One evening he and two of his fellow experimenters decided to make a trial of the vapour given off by this new Liverpool fluid. They poured it into three tumblers, sat down at the dining table and began to inhale it, only to find that it stimulated rather than soothed them. Instead of becoming drowsy, they all became animated and loquacious. Then suddenly everything changed, and when the lady guests, who had withdrawn from the dinner table for a time, returned to the dining-room to find out what was happening, their eyes were greeted with the sight of the three gentlemen lying prostrate under the table. Chloroform was discovered that night and was added to laughing gas and ether as a suitable method of securing anæsthesia during an operation. That it was an addition of some value is indicated by the fact that chloroform is still used for special cases and more particularly as a method of alleviating the pains of childbirth. Its chief disadvantage is that the margin between safety and danger is a narrower one with chloroform than it is with

either ether or nitrous oxide. For this reason, chloroform is not a widely used anæsthetic at the present day.

The anæsthetist

Every new technique produces in time an expert in the use of this technique, and anæsthesia has produced the anæsthetist. He is a very highly trained specialist, a valuable colleague of the surgeon's, and a man on whose shoulders a very heavy responsibility falls. That it may be no small undertaking to administer a good anæsthetic will be realized when it is recalled that a modern plastic operation may require four to five hours for its completion and that surgeons now operate on the throat, lungs and heart, all organs on which the anæsthetist has to rely while giving an anæsthetic. It may indeed be said that but for the various methods and refinements of giving anæsthetics devised by the anæsthetists many modern operations could not be performed.

Local anæsthesia

The idea of producing a local anæsthesia was never laid aside, and local anæsthesia is extensively used in modern surgery. The anæsthesia is obtained by putting out of action the pain-transmitting nerve-fibres supplying that area by means of some derivative of cocaine. Cocaine is another example of a remedy derived from a primitive school medicine. We owe the gift of cocaine to the Incas, who regarded the coca-plant with the greatest veneration and offered up its leaves to their sun deity. They also chewed its leaves and were said to be capable of performing incredible feats of endurance under its influence. But no use was made of cocaine in surgery until 1884, when Koller first employed it as a local anæsthetic in eye operations. Since then the chemists have got to work and,

having first discovered the chemical structure of cocaine, they afterwards synthetized various cocaine-like compounds. These compounds have the advantage of being less toxic than is cocaine itself, and they are now employed extensively in plastic and other forms of surgery. Local anæsthesia can be produced in a number of different ways. The local anæsthetic can be infiltrated under the skin, injected into the nerves supplying the field of operation, or injected into the spinal canal so as to catch these nerves as they issue from the spinal cord.

New anæsthetics are continually being discovered and novel methods of giving them devised. It is interesting to note that the Incas of Peru have contributed yet another valuable drug to the speciality of anæsthetics—namely, curare. The old hunters of Peru dipped their arrowheads in this poison because they had found that by doing so they lost fewer of their arrows through the wounded animal's escaping. The poison absorbed from the arrow into the animal's blood stream acted by producing a paralysis of the muscles. It is now known that curare acts on the terminals of the motor nerves in the muscles. One of the requirements of the surgeon is that the muscles of the patient should be well relaxed, and when the anæsthetist is unable to bring this about by means of the anæsthetic alone, he does so by injecting a small dose of curare. Considerable use is being made of this method of putting out of action muscles which remain tense after the patient has been anæsthetized.

The conquest of sepsis

Sepsis was as great a hindrance to the surgeons of the past as was pain, and in no place was suppuration more rampant than in the surgical wards of the hospitals. So serious was it

that anyone who was nursed in a surgical ward was in grave danger of dying of blood poisoning. Wounded soldiers consequently stood a much better chance of recovering from their injuries when the military hospitals were so full that they had to be housed in private dwellings. Nor was it the wounded soldier alone that was in danger of dying of sepsis in a hospital. The plight of women delivered in the maternity wards was equally desperate, for a great many of them developed puerperal fever. Nor was this surprising in view of the fact that hospital students and doctors often went straight from the carrying out of a *post mortem* to the job of delivering a child, without any other formality than a perfunctory washing of the hands. Nor did all this happen in a very distant past. There are octogenarian doctors of to-day who can still remember the days when hospital surgeons kept their old blood-stained operating coats hanging on a peg in the room adjoining the operating theatre. They tell us that hands were washed *after* the operation had been completed rather than before it because the surgeon deemed it absurd to be fussy about his hands on the eve of carrying out what would inevitably be a messy proceeding. Why should he wash his hands and then soil them again? As well might a gardener scrub himself before starting on a particularly dirty piece of weeding. After the operation had been completed, the instruments were wiped clean of blood and put back into the instrument drawer, to stay there until they were needed again. Hands were rinsed of blood and the old coat was hung again on its customary peg. The smell emanating from the operating theatre was only a little less unpleasant than that coming from the wards, in which supuration was rife. Some surgeons were even inclined to welcome a little redness in the neighbourhood of operation wounds. It showed a good reaction on the part of the patient,

and the exudate welling up from the depths received the name of "laudable pus." "Laudable pus" was believed to be a sign that the wound was in process of healing!

The rise of antiseptic surgery

The story of the partnership between Louis Pasteur and Joseph Lister, and of what happened as a result of it, is so well known that it does not require retelling. The word "partnership" is a fitting one, but in actual fact these two great surgical pioneers met only once, and then towards the end of their lives, when they had both achieved world-wide fame. Until this meeting the only communication between them was through the medium of scientific treatises and occasional letters. Whilst Pasteur was carrying out his epoch-making work on the fermentation action of micro-organisms in France, Lister was practising as a young surgeon in Glasgow. He came across accounts of Pasteur's work and of his views on the subject of micro-organisms, and the more he thought about these minute forms of life, the more convinced he became that they were also responsible for suppuration in wounds. In 1874 he wrote to Pasteur expressing his admiration for his work and stating that he had reached the conclusion that micro-organisms were responsible for the putrefaction occurring in wounds. He told him also that he was now attempting to destroy them by means of carbolic sprays and dressings. "Allow me," he added, "to take this opportunity to tender you my most cordial thanks for having, by your brilliant researches, demonstrated to me the truth of the germ-theory of putrefaction, and thus furnished me with the principle upon which the antiseptic system can be carried out."

Lister regarded the air as the chief means by which germs

gained entrance to open wounds, and by his advocacy of antiseptics as the best way to prevent this he became the father of antiseptic surgery. He also advised extreme cleanliness as an addition to the use of antiseptics. It was Lister who introduced the surgeon's clean white operating gown and the careful washing of hands prior to every operation. By his insistence on cleanliness as well as the use of antiseptics, he laid the foundations of the "aseptic" school of surgery which has now supplanted the older Listerian or "antiseptic" school of surgery. The aim of the modern surgeon is to exclude all micro-organisms from the area in which he is working rather than to permit their entry and then destroy them afterwards with antiseptics. In order to do this, everything which comes into contact with the field of operation must be carefully sterilized, usually by heat, but sometimes by antiseptics. Operating theatres are now constructed so as to allow of their being frequently washed; sterilized clothing, rubber gloves and masks are worn by the surgical and nursing staff, and many other things are done to banish hostile organisms from the scene. It is true that antiseptics are occasionally employed, but their use has been reduced to a minimum. Modern surgery is based on asepsis, and antiseptics is regarded as the second line of defence. The two men mainly responsible for this substitution of aseptic for antiseptic methods were Bergmann and Simonelbusch, and they, like their great predecessor, Lister, met with considerable opposition from their colleagues before their principles were accepted by the medical profession as a whole. It was not, indeed, until the opening years of this century that the aseptic school of surgery was securely established.

The gain to surgery from the use of an aseptic technique has been an immense one. Not only have operative risks been

markedly reduced, but the surgeon has been enabled to undertake operations which previously he would never have dared to attempt. Every year has seen him becoming bolder and bolder and opening up new fields for his work. Now there is no region of the body into which he is not prepared to venture; the joints, the abdomen, the brain, the chest, the central nervous system and even the great blood vessels and the heart have all come under his sway. But however carefully the principles of asepsis are applied, once in a while infection follows an operation, thereby endangering the patient's life, or, if not so serious as to do this, prolonging the duration of convalescence. The possibility of infection still remains an anxiety to the surgeon, though much less so than it formerly was. It is a complication which the plastic surgeon particularly dreads, because his work would be likely to be ruined by even a mild infection of flaps. What is vital to the success of the plastic surgeon's work is that operation wounds should heal by what is known as "primary intention." It is extremely fortunate therefore that the discovery of the sulphonamide drugs and of the antibiotics have now come to his aid and removed much of his anxiety. By using these as preventive measures, he is able to reduce to a minimum the chances of post-operative infection.

The discovery of the sulphonamide compounds

As has already been stated, the year 1909, the year in which the great German chemist, Ehrlich, discovered salvarsan, was a date of immense importance in the history of medicine. It marked the beginning of a new era in which the chemist gave his aid to the doctor in his search for specifics. When Ehrlich produced salvarsan, or 606, he was under the impression that he had discovered what he had set out to find, a *therapia magna*

sterilan, or a great sterilizing injection. But subsequent experience showed that salvarsan did not entirely fulfil Ehrlich's requirements. It was not entirely innocuous to the patient and it failed to kill all the spirochætes of syphilis. Yet another thing was proved: that the action of salvarsan on the spirochætes was not a direct one, but that it acted through the intermediary of the patient's tissues. Modifications of Ehrlich's original arsenical compound were later introduced which rendered it less toxic, and these later arsenical preparations are still being used in the treatment of syphilis.

From Ehrlich's time onwards chemists all over the world have been searching for other specifics, and with considerable success. Synthetic remedies have been produced for such diseases as amœbic dysentery, sleeping sickness, malaria, pneumonia and streptococcal infections. It is with the last-named specifics for pyogenic infections and with their mode of action that we are now only concerned. As has already been said, the sulphonamides, or sulpha drugs, were discovered shortly before the outbreak of the last war, and it is interesting to note that, unlike Ehrlich's compound, salvarsan, they have a direct action on the organisms responsible for blood poisoning. They act by preventing these organisms from obtaining the nourishment they require, and thus arresting their growth.

It has often happened in the history of medicine that the discovery of one valuable remedy for a disease has been quickly followed by the discovery of yet another one. No sooner had surgeons been given the boon of the sulpha drugs than they were presented with penicillin. As a result of these two remedies, post-operative sepsis has become so rare that it is no longer a serious trouble to the surgeon.

Shock and hæmorrhage

Improvements in the technique of surgery and of anæsthesia have led to more and more formidable operations being undertaken, and operations which twenty years ago would have been dismissed as too dangerous to be attempted are now of everyday occurrence. But some of these modern operations impose a severe strain on the patient. They are so severe and take so long to accomplish that he is liable to suffer from post-operative shock. A great deal was learnt during the two world wars about the nature of wound shock and its treatment, and this knowledge is now proving of great value to the civil surgeon. The chief changes noted in the body of a patient suffering from post-operative shock are stagnation of the blood in the capillaries and loss of body fluid, a condition that can be summed up in the word "dehydration." In cases of post-operative shock, the total volume of blood circulating in the patient's blood-vessels has been reduced, not only by any hæmorrhage that may have occurred during the course of the operation, but also by subsequent leakage of blood plasma through the capillary walls. As a result of this passage of plasma from the capillaries into the tissues and of the reduction of the total volume of blood, the heart is no longer able to maintain a satisfactory blood pressure, and the patient collapses. Much can be done to prevent the onset of post-operative shock by quickly replacing any blood that has been lost during the course of the operation. Advances in the technique of transfusion and the institution of a well-run transfusion service have materially reduced the danger of post-operative collapse. The four great obstacles to surgical progress; pain, sepsis, hæmorrhage and shock, have therefore to a great extent been eliminated.

Chapter X

THE SURGERY OF THE FUTURE

THIS book deals with the relationship of medicine to society in the past, present and future. It follows the lineage of the doctor from his various origins in the priest-physicians of Egypt, the philosophers of ancient Greece and the medicine-men of more primitive cultures. It is concerned with his relationship to society and with the still more intimate relationship existing between him and his patients—a relationship which must not be destroyed if the latter are to be relieved. It deals with the rise of scientific medicine in the seventeenth century and records the immense gains that have accrued from the partnership between the doctors, the biologists and chemists. It also describes the rise of specialism, and points out the dangers resulting from the specialist's limited view of his patient. In the previous chapter the work of the surgeon was described, and in this one an attempt will be made to foretell the nature of future advances in the surgeon's art.

The surgeon is a tailor or engineer, a repairer of broken and torn structures, a handyman who rectifies the mechanical errors of the body. When a duct is blocked he removes the obstruction; when it is dilated, he pleats it and thus reduces its calibre; when it is severed he sews the separated parts together. He is the physician's skilled assistant who is called upon to lend aid when the patient has failed to overcome an infection and an abscess has formed and requires opening and drainage. For lack of better medical methods of treatment, the surgeon removes malignant growths and acts as the spearhead of the

medical attack on cancer. Although his main work is that of a mechanic, he must also possess a knowledge of the gardener's art of grafting, a part of his work which is likely to increase in the future.

With advances in medical methods of treatment and with an earlier intervention of the psychologist and the physician, the surgeon will be relieved of some of his present duties. His work will be reduced because more and more medical knots will be unravelled and fewer will be left to be cut. All operations, with the exception of plastic operations for the repair of damage inflicted by accident, are confessions of failure. The reason why the surgeon has been called in is that the patient's body has failed to regain its inner harmony in spite of the physician's efforts to help it to do so. An example will make this clearer. A man of the regressive type, over-sensitive and disposed to worry, suffers from an emotional conflict and begins to complain of indigestion. His family doctor treats him for hyperacidity by dieting him, but in spite of this the trouble gets worse and a consultant physician is called in. An X-ray examination is now ordered and the presence of an early duodenal ulcer is confirmed. The patient now passes into the consultant's care in a hospital and he is treated by prolonged rest in bed, dieting and alkalis. For a time he improves, but on returning to work he relapses and has to return to the hospital. By this time the pathological changes in the duodenum have passed beyond the stage at which they are reversible and the new X-ray reveals the existence of a gross deformity of the pyloric orifice and the duodenum. Even if the ulcer were eventually to heal—which is now unlikely—his digestion will remain gravely impaired. A consultation is now arranged with a surgeon and a partial gastrectomy is advised and subsequently carried out. The knot which the physician

was unable to untie has had to be cut; a trouble which began as an emotional conflict, and which resisted the efforts of the physician to cure it, ends thus in an operation. This story, with a number of variations, can be told of many of the surgeon's patients.

Surgery is a saver of life, a reliever of pain, a restorer of health. It has brilliant achievements to its credit, but in the main it is a destructive, rather than a constructive, art. Yet there is a possibility that the constructive side of surgery will grow in the future. The day may come when, instead of removing diseased organs, the surgeon will be in a position to replace them, and should this happen the whole outlook for surgery will have changed. Technically, the grafting of an organ into the human body is already possible, but a formidable obstacle stands in the way which must be overcome if organ-grafting is to become a practical proposition. This subject is of such importance that it must be discussed more fully.

The question of cytolytins

The body resents the intrusion of foreign material and reacts with varying degrees of violence against it. This fact is of great importance to the surgeon, for he introduces foreign material into his patient's body whenever he ties a bleeding blood-vessel with catgut or silk, or draws tissues together by means of buried sutures. The tissues promptly attack these foreign elements and eventually manage to get rid of them. On the whole this is an advantage, and whenever the surgeon is compelled to insert deep stitches, he deliberately selects suture material obtained from animal sources, such as catgut, in order that these deep stitches may be the more readily absorbed.

But the situation is quite different when the surgeon is making use of grafts in order to replace tissues that the patient

has lost. In this case the action of the cytolytins, or antibodies circulating in the blood responsible for the destruction of cells of foreign origin, renders his operation useless. An example of this will be given. Some twenty years ago the French surgeon Voronoff made a world-wide reputation amongst laymen, but not amongst surgeons, by his so-called rejuvenation operations. He belonged to Brown Séquard's school of thought, and believed that failure of the sexual glands was an important factor in the process of ageing. Since no effective testicular extract was available at that time, Voronoff attempted to make good the supposed testicular deficiency of old age by means of grafts. He used for this purpose grafts taken from the testes of chimpanzees and claimed that excellent results were obtained from transplanting them on to aged men. The writer of this book was also carrying out grafting experiments for the same purpose, but was obtaining his grafting material from human testes which had had to be removed on account of their being misplaced. In a conversation with Voronoff he pointed out that even with this superior human material his grafts were rapidly absorbed, and he tactfully suggested that their disappearance must of necessity be still more rapid when grafts were taken from such an alien source as a chimpanzee. But Voronoff was a surgical enthusiast rather than a critical scientist, and he maintained that the benefit he conferred on his patients lasted for three, four, or even five years, and he added that the operation could always be repeated if by the end of that time the grafts had disappeared. There is no scientific justification for Voronoff's claims. Grafts taken from alien sources are rapidly absorbed.

Grafting material can be graded under three headings, in accordance with its source: auto-grafts, taken from the patient's own body; homo-grafts, taken from another person;

and hetero-grafts, taken from animal sources. Up till the present time auto-grafting has alone proved highly successful, there being only one exception to this rule. The grafting of corneas as a cure for blindness caused by corneal opacities is often successful in spite of the fact that homo-grafts are being used. Fortunately, the patient's body accepts the presence of a cornea taken from another person, and thanks to this sight has been restored to a number of blind people. But why, it may be asked, is a corneal homo-graft an exception to the rule that homo-grafts are rapidly absorbed? No certain answer can be given to this question, but it is probably because the cornea is a completely bloodless structure. Now blood, as Goethe remarked in *Faust*, is "a very special fluid," and, as everybody knows, it is always necessary to make sure that the blood of the donor is compatible with the blood of the recipient before a transfusion is carried out. If this precaution has not been taken, it may well happen that the blood of the recipient is broken down by the blood he has been given, with disastrous results. It is now known that there are four main groups of human blood and a number of less well-defined subsidiary groups. As the survival of a graft is dependent on its being nourished by the host's blood, it must often happen that the blood it receives is of the wrong kind. But because the cornea is a tissue nourished by the transudation of lymph, it is less dependent than are other grafts on the recipient's blood group. This probably explains why corneal grafts have a better chance of surviving.

The future of grafting

The one great obstacle which stands in the way of any further progress in the surgery of grafting is undoubtedly this fact that grafting material can only be obtained from the patient

himself. Were this difficulty to be overcome so that grafts from other people could be used not only tissues, but whole organs would become transplantable in this way. Surgical technique is sufficiently advanced to allow of this being done, for surgeons are now able to join blood vessels together without interference from clotting. A junction could therefore be made between the recipient's vascular system and the blood vessels of the grafted organ so that blood would circulate through it. But until this formidable difficulty that grafts from another person are destroyed by the cytolytins circulating in the recipient's blood can be overcome, the great new era of constructive surgery cannot begin. That the failure of homo-grafting is, at any rate, partly due to discrepancies in the blood-groups of the donor and the recipient is supported by the fact that the nearer the two are related the longer is a homo-graft likely to survive. When the recipient and the donor happen to be identical twins the homo-graft survives so long that some experts believe that, for all practical purposes, it is as satisfactory as an autogenous graft, that is to say, a graft taken from the patient's own person.

Limited use of homo-grafts

Although homo-grafts are absorbed, they may last sufficiently long to serve the limited purpose of acting as a scaffolding for the growth of new tissues. An example taken from grafting experiments carried out on animals will make this clearer. It has been found possible to remove a considerable length of the main artery, or aorta, from a dog provided that the missing length of blood-vessel is immediately replaced by a graft of aorta taken from another dog. The transplanted aorta permits of the circulation being maintained sufficiently long to allow of tissues from the dog's own aorta growing into and gradually

replacing it. The homo-graft of aorta acts exactly in the same way as a segment of nerve acts when it is used to bridge a gap in a severed nerve. When a surgeon finds that a length of nerve is missing, as the result, say, of a gunshot wound, he connects the two separated ends by means of a bridge of nerve tissue taken from another nerve in the patient's body. The bridge acts as a scaffolding along which nerve fibres from the central end of the severed nerve grow until eventually the continuity of the nerve is re-established. Strictly speaking, neither of these two operations are true instances of grafting but are merely devices for assisting the body to repair its injuries by providing it with a guide or mould for its repair processes. The transported length of aorta mentioned above acts only as a scaffolding along which the dog's own aorta grows.

Until homo-grafting becomes a practical proposition, the surgery of grafting must remain severely limited by the fact that the surgeon is forced to obtain his material from the patient's own body. He is able to close skull defects with bone taken from the patient's tibia or shin-bone, he can repair mutilations of the nose with cartilage shaved off from the patient's ribs and he can make good losses of skin with skin-grafts taken from other areas of the patient's body. But the amount of material he can obtain in this way is strictly limited. It is quite inadequate to supply the needs, say, of a small child who has been severely burned. The restrictions imposed on the surgeon by the cytolytic changes of his patient's body are therefore very serious, and no great progress will be made in the art of grafting until they have been removed.

The preservation of grafts

It is obvious that a graft must be used whilst it is fresh and before its vitality has become impaired. If homo-grafting

becomes possible in the future, some method will have to be found of preserving grafting material until it is needed. Otherwise it would be necessary to carry out the grafting operation a few hours after the material had become available, and this might be difficult to arrange, especially if the graft had been obtained from a corpse. A considerable amount of information has already been collected on this subject of preserving grafts. It has been found that corneal grafts can be kept alive in a refrigerator for twenty-four hours to forty-eight hours, and the more rapidly the freezing has been carried out, the longer does the grafting material survive. This is probably explained by the fact that rapid freezing produces small ice-crystals within the tissues, whereas slow freezing produces larger and therefore more disruptive ice-crystals. Grafts are now being frozen by means of liquid nitrogen, and blood vessel grafts treated in this way have been kept alive for several weeks.

Another, but lesser, difficulty will have to be overcome when it becomes possible to extend the range of homo-grafting. As the law stood at the time at which this book was begun, no one was able to leave his body to the surgeons after his death in order that they might make what use of it they liked. From the moment of death a man's body became the property of his executors and much valuable time was lost before permission could be obtained to carry out his desires. As a result of this difficulty thousands of blind people were kept waiting for corneal grafts which were not yet available. Fortunately this absurd state of affairs was recently remedied by the introduction of a private member's bill making it possible for a would-be donor to dispose of his corneas as he liked. It is to be hoped that there will be no difficulty in extending the scope of this bill in the event of other forms of homo-grafts being needed.

If these difficulties can be overcome surgery will make

spectacular advances. The surgeon will no longer be handicapped by the fact that he is unable to emulate the motor mechanic and supply new parts but on finding that an organ is seriously damaged, he will remove it and immediately replace it with another. He will, for example, send for a kidney stored in the theatre refrigerator and having anastomosed its severed blood vessels with those of his patient, he will have replaced the hopelessly diseased kidney by a new one. Then will a new era of constructive surgery be inaugurated and instead of only being called upon to patch up or to remove, as at present, the surgeon of the future will be asked to replace. Only one real obstacle stands in the way of this new age of constructive surgery—the patient's cytolsine. Will this difficulty eventually be circumvented? No one can say, but stranger things have happened.

Chapter XI

PUBLIC HEALTH

So far, attention has been directed exclusively to the *curative* side of medicine, and little has been said about the *prevention* of illness. Yet the prevention of illness is as important a part of a doctor's work as the treatment of a patient already ill. The aim of the doctors should be to maintain health rather than to cure disease, but, as has been stated, the medical profession has been so occupied with the treatment of disease that it has been unable to give sufficient attention to the study of the positive condition known as health.

Prevention is undoubtedly better than cure, and a great deal has been done by public authorities during the last fifty years to safeguard the health of the community. More and more is it being realized that ill-health is a matter of concern to the community as well as to the individual. Man is a gregarious animal, and if the disease from which he is suffering happens to be of a contagious nature it carries with it a threat to the health of his fellow men. And even when the sick man's disease is non-contagious, it still concerns the society of which he is a member. He will have to be looked after until he is able to fend for himself again, and should he be so unfortunate as to be left permanently disabled by his illness, he will become a lasting liability to others. This being so, all governments that have taken upon themselves responsibility for the welfare of their citizens have encouraged an intensive study both of the factors responsible for disease and of the measures which can be taken to reduce its incidence. In other

words, public health has become an important branch of medicine.

As has been seen, diseases are usually the result of multiple rather than single causes. It has also been pointed out that the discovery of pathogenic organisms in a patient's secretions does not necessarily explain his illness. Our bodies possess formidable defences, and unless these have been weakened, we are generally able to withstand invasion by disease-producing germs. The experts in public health therefore study amongst other things the various conditions likely to lower our resistance and the best methods of reducing the incidence of illness. We shall first discuss what steps have already been taken to safeguard the health of the community and then consider what advances are likely to be made in the future in this science of public health. In order that the progress made by public health during the last two centuries may be appreciated it will be helpful to start by making a brief survey of the conditions of living in the past. Seventeenth-century London will be selected for this purpose.

Seventeenth-century London

In the Stuart period the conditions under which the poorer inhabitants of the city of London lived were appalling, so primitive, indeed, that it is not surprising that recurrent epidemics took serious toll of them. London was a system of alleys rather than of streets, and of alleys into which sunlight rarely entered, many of them being so narrow that the overhanging houses all but met overhead. These buildings were constructed mainly of wood and plaster and the filth and rubbish that for many years had been accumulating in their cellars overflowed into the alleyways. "Foul streams like the Fleet, defiled from every overhanging house and neighbouring

alley. . . . Lay stalls of rotting town refuse, the sweepings of the streets, houses and middens were piled near inhabited quarters . . . low overhanging wooden houses, ill kept, dark and congested, covered the ground in seemingly impenetrable rookeries of filthy courts and blind alleys. Back to back building was customary to save cost and space. . . . Summer flies pestered the houses in such multitudes that they lined the walls, and where thread or string hung down, it was presently thick with flies, like a rope of onions. Ants covered the highways, swarming so thickly that a handful at a time might have been taken up, and the croaking of frogs was loudly heard even before the ditches sheltering them could be seen" (W. G. Bell, *The Great Plague of London*. Quoted by S. Luff in *The Health of the People*).

The above description is a graphic one but no mention is made in it of rats and it is obvious that old seventeenth-century London must have been a veritable paradise for rats. Life in a rat-infested house is always unpleasant, but those who lived in these dark alleys were threatened with something far worse than discomfort from vermin. Rats are infested with fleas and it is by these fleas that bubonic plague is spread. The conditions in which the citizens of London lived were ideal for the outbreak and the rapid spread of a great epidemic, and in 1665 the plague arrived. Those who could do so fled, with as much of their belongings as they could carry with them. The Court and the Government departed in haste, and did not return from the country for seven weeks. Their one concern was to save themselves and their sovereign from contagion, and during their absence the death rate in London rose steadily until it reached the figure of 1,000 a week. This is an unheroic story but what could the Court and its officials have done had they remained? The only health measure available to them was to

get away from London as rapidly as possible, and, as Luff has said, the Court had an excellent precedent for its precipitate departure. In the previous century and in similar circumstances, Queen Elizabeth had made an escape with her court to the village of Windsor. And Queen Elizabeth took far sterner measures to safeguard herself and her friends than did Charles II. Her quarantine technique was to have gallows erected in the market-place at Windsor on which all unofficial visitors from London were promptly hung without delaying for such niceties as a trial. Not that Elizabeth had neglected all public health measures before departing in haste for Windsor. She had given orders for the erection of wooden pest-houses outside the city walls, to which plague-stricken patients were to be transferred, on a magistrate's order, and left there until they recovered or, what was far more likely, until they died.

The plague was not the only danger to which the slum citizens of London—and by modern standards most of London's dwelling quarters could be considered slums—were exposed. Even when the dreaded Black Death had departed and city life had again become normal, some 2,000 of them were carried off annually by the lesser pox, now known as smallpox.

The first Public Health Act

Nothing was done in the succeeding eighteenth century to safeguard the health of London's citizens, and even so late as the earlier decades of the nineteenth century the sanitary conditions in London were very little better than they had been in the times of the Stuarts. It is true that the Poor Laws had been passed in the intervening years and that vaccination was now being practised against smallpox, but nobody had as yet

realized the close connection between health and such matters as sanitation and water supply. Epidemics were accepted as natural and therefore as inevitable scourges. In 1831, London suffered from quite a severe epidemic of cholera and six years later many of her citizens died of typhus. But fortunately some of the Commissioners of the new Poor Laws were sufficiently impressed by these two events, and by a number of less serious epidemics following them, to appoint a medical commission to go into the matter. This commission carried out its work conscientiously and issued a report. The report stated that in one of the London areas, with a population of 77,000, 14,000 people suffered annually from fever of one sort or another and that 25 per cent. of those attacked died. This report was sent by Chadwick, the Secretary of the Commissioners of the Poor Laws, to the Home Secretary, together with a covering letter. As a result of his strong action, a Select Committee was appointed "to inquire into the circumstances affecting the health of the inhabitants of the larger towns, with a view to improved sanitary arrangements for their benefit." The report and the letter had evidently succeeded in drawing the government's attention to the close connection between sanitation and health and unlike many commissions appointed by governments, this new one issued a statement within three months of its starting work. It recommended the passing of a Building Act and a Sewerage Act, the setting up of local health boards, and the appointment of a number of sanitary inspectors. It also advised that the following matters should be seriously considered: the state of London's water-supplies, its burial grounds, lodging-houses and public baths. It suggested that the local authorities should be given powers to clean, to supervise and to improve all sites in the city. These recommendations were excellent, but meanwhile the

Government of the day, as so often happens, had lost all interest in what it had begun, and postponed action indefinitely. It was fortunate that Chadwick, the man who, more than anybody else, had originally been responsible for the appointment of the Commission, reacted to this as he did. He refused to accept the Government's delay in putting into action the Commission's recommendations. His persistent efforts to induce it to move were assisted by rising public discontent, and were not without affect. The counter-move on the part of the Government was the customary one of appointing yet another commission to collect still more evidence. This gained them a few years' respite, but finally the politicians were forced by public and private clamour to give way. The First Public Health Act of 1848 was passed. This established a Central General Board of Health and authorized also the appointment of local boards of the same kind.

Although an advance had been made, few beneficial results followed the passing of the Public Health Act, and in 1869 a Royal Commission was appointed to review the situation. It was recognized that the first Public Health Commission had done some good, but not as much good as had been hoped. The Royal Commission came to the conclusion that this was because the work of the Health Board was too poorly co-ordinated, and it recommended that "the present fragmentary legislation should be consolidated." It even proposed the establishment of a Ministry of Health, but instead of a new ministry being formed, the Local Government Board came into being. Sir George Newman, late Chief Medical Officer of the Ministry of Health and author of *The Rise of Preventative Medicine*, states that the Royal Commission was of the opinion that the new Local Government Board should be responsible for the following activities.

“(i) The supply of wholesome and sufficient water for drinking and washing.

“(ii) The prevention of the pollution of water.

“(iii) The provision of sewerage and utilization of sewage.

“(iv) The regulation of streets, highways, and new buildings.

“(v) The healthiness of dwellings.

“(vi) The removal of nuisances and refuse, and consumption of smoke.

“(vii) The inspection of food.

“(viii) The suppression of causes of diseases and regulations in case of epidemics.

“(ix) The provision for the burial of the dead without injury to the living.

“(x) The regulation of markets, etc., public lighting of towns.

“(xi) The registration of death and sickness.”

These recommendations were incorporated in the Public Health Act of 1875, the passing of which is a landmark in the history of sanitary reform. It is of importance if for no other reason than that it marks a change from a merely negative policy of getting rid of public nuisances to a positive policy of striving to prevent disease and of raising the general level of health. Other equally positive reforms were to follow the passing of this Act, such as the care of the mother and her child, the housing of the people, town and country planning, properly organized treatment for infectious diseases, tuberculosis, mental deficiency and lunacy, etc. Finally, the Public Health Act of 1875 is of historical importance because it advocated a much closer co-operation between the medical

man and the State than had hitherto been known. They were to form a partnership, not for the purpose of curing the sick, but for stamping out disease. The Act marks therefore the beginning of the era of preventive medicine.

Preventive medicine

For success in stamping out disease we must first know its cause and the way in which it spreads. Armed with this knowledge, we are in a position to carry out a war of attrition on it, but without it little can be done. This explains why our success in dealing with such infective diseases as infantile paralysis, and foot-and-mouth disease amongst cattle, has hitherto been a limited one. We are aware of the fact that both of these diseases are caused by viruses, but as yet we have only a very partial knowledge of their method of spreading. In contrast to this, we have an exact knowledge of the dissemination of malaria and have been able to rid large areas of the tropics of this scourge. The anti-malarial campaign has indeed been such an immense success that it may be taken as a model of preventive medicine. It illustrates so well its principles that an account will be given of it.

The History of the Anti-malarial campaign

A discovery in the pathology of one disease often leads to a similar discovery being made in the pathology of another disease, and if the story of the conquest of malaria is to be complete, it must begin at an earlier date—namely, with Patrick Manson's investigation of that well-known tropical complaint, elephantiasis. While working on this subject in 1876, Manson evolved the theory that the tiny worm-like filaria found in the blood of sufferers from this trouble emigrated sometimes into their lymphatics. This would

explain the obstruction of the lymphatics which was responsible for the swellings characteristic of elephantiasis. After examining the blood of some hundreds of patients, he discovered that there was a periodicity in the appearance of the filaria in the patient's blood and that they became particularly numerous towards sunset, attaining their maximum at midnight. Then the filaria began to diminish in number, and by noon next day they had entirely disappeared from the blood. This suggested to him that these tiny filaria were the offspring of adult worms which lived in the lymphatics, and that the filaria sought the subcutaneous blood for the purpose of developing there. It also occurred to Manson that if this theory of his were correct, the most likely intermediate host responsible for the parasite might be some free-ranging, blood-sucking insect. Some sort of mosquito must be responsible for the spread of the disease by carrying the filaria from one patient to another. It was significant, therefore, that the mosquito was a night-feeder and that it was at night that the blood contained the maximum of filaria. He put his theory to the test by enlisting the help of a Chinese patient suffering from elephantiasis, who allowed himself to be bitten by mosquitoes. The mosquitoes used for this purpose were afterwards caught and examined. He found that a few hours later their stomachs were full of filaria that were in the process of making their way through the stomach walls towards the mosquitoes' chest muscles. Not only were the filaria emigrating from the stomachs in the direction of the chest muscles, but they were also developing in size as they did so in preparation for their reception by a new host. These discoveries of Manson's introduced an entirely new conception into tropical parasitology, the idea that an important part was played in their spread by blood-sucking insects.

A few years later Laveran, a French Army surgeon, reported the existence of malarial protozoa in the blood of patients suffering from malaria. Manson was inclined to think that as the mosquito was responsible for the spread of elephantiasis, it might also prove to be the intermediate host in malaria. He mentioned this idea to Ronald Ross, a young officer in the Indian Medical Service who was engaged in research, and in the course of the next few years Ross proved that Manson had been right. There could be no doubt that the mosquito was the carrier of the malaria plasmodium from one patient to another. His discovery was of the very greatest practical importance, for it provided the means by which malaria could be controlled. The mosquito responsible for the spread of malaria was *Anopheles*, and if these could be destroyed malaria would be stamped out. The measures subsequently evolved for the prevention of malaria are well known. All individuals living in a malarial district are protected, so far as is possible, from mosquito bites by sleeping behind mosquito-nets and by donning, after dusk, anti-mosquito clothing, long-sleeved jackets and mosquito boots. Face creams containing dimethyl phtholate are also used as insect repellents and the windows of the houses are protected with metal gauze. The special measures to be adopted against the multiplication of the mosquitoes are drainage, clearing away grass and other vegetation from the banks of ditches and ponds and the filling in of ruts and hollows into which water drains and stagnates. Larger pools which cannot be filled in are covered with a thin film of oil every week on the grounds that this suffocates the mosquito larvæ in process of developing on the surface of the water. The preparation known as D.D.T. is now added to the oil or the kerosene with which the walls and ceilings of houses are sprayed. As an additional precaution against malaria,

all men and women who enter highly malarial districts are given prophylactic doses of paludrine and chloroquine. It is important to note that the main line of attack in the anti-malarial campaign is on the intermediate host, the mosquito.

Stamping out disease by the elimination of the intermediate host

The measures adopted against bubonic plague and typhus are other examples for preventing a disease by eliminating the parasites responsible for its spread. Plague is disseminated by rats, not by the rat itself, but by the fleas with which it is infested. It can also be carried by small rodents, such as chipmunks, squirrels and field-mice. The destruction of the intermediate host is supplemented by isolating those who have already become victims of the disease and by vaccine-therapy. Typhus is spread by lice, fleas and ticks, and formerly the only way of getting rid of these lay in baths and the delousing of clothing by steam. The discovery of D.D.T. has greatly facilitated this work, for all that is now required is to blow a dusting powder containing this drug down the neck and up the sleeves and trouser-legs of everybody needing delousing.

Other methods of preventive medicine

Elephantiasis, malaria, plague and typhus are spread by an intermediate host, but in the case of most non-tropical diseases the infection is a direct one from patient to patient. This being so, other methods of prevention have to be employed, and more particularly, isolation of the patient during the contagious period of his illness. The vehicles by means of which contagious and infectious illnesses are spread are different in different cases. The commonest way is by the patient's secretions; in

measles and whooping-cough by droplets of expectoration projected into the air in the act of coughing and in typhoid by the fæces and urine. In some infectious and contagious diseases the precise method by which they are spread is not yet known.

Vaccination

Up till now the emphasis has been placed on two preventive measures, the elimination of the intermediate host and the isolation of infected men and women. There is yet another valuable method of dealing with contagious diseases—namely, to raise the resistance of everybody exposed to infection by means of vaccination. The first disease to be dealt with in this way was smallpox and, as is well known, vaccination supplanted an earlier method of conferring immunity by exposing people to infection with a mild form of this disease. Smallpox vaccination was introduced by Dr. Jenner, who learnt the interesting fact that milkmaids were very seldom attacked by smallpox. On further inquiry, he found that at one time or another almost all milkmaids had suffered from what was popularly known as “cowpox.” In other words, they had developed pustules on their hands as a result of their milking cows that had similar pustules on their udders. Jenner thought that it would be worth while to try to protect people from smallpox by inoculating them with material taken from these cow pustules. When his idea was put into practice it was successful and proved to be a far more reliable and safer method than that of exposing people to smallpox contagion.

It is now known that smallpox and cowpox are both due to infection by ultra-microscopic viruses. Viruses can be cultivated only with great difficulty, and there is another great

disadvantage attached to them. Whereas it is easy to make vaccines of a known strength from cultures of the larger organisms, such as the typhoid bacillus, it is difficult to employ the same technique in the case of invisible viruses. This method of raising the body's resistance to a particular organism by the injection of a vaccine is a valuable preventive measure. It was put into practice on a large scale at the beginning of the First World War, and with magnificent results. Whereas the Army casualties from typhoid fever during the preceding Boer War exceeded those resulting from gunshot wounds, the number of men who contracted typhoid during the succeeding two world wars was negligible, a fact that can be attributed almost entirely to the use of vaccine-therapy.

Various kinds of vaccines are now in use. Sometimes it is the dead bacillus that is injected into the patient and sometimes a living but attenuated form of it. In yet other cases it is the toxin formed by the bacillus and not the bacillus itself that is used, but whatever the method employed, the results have been very satisfactory. The dramatic decline in the incidence of diphtheria is an example of this. At one time, thousands of children in Great Britain died annually of this disease, yet Dr. W. P. D. Logan, chief medical statistician of the General Register Office, is now able to write of diphtheria as follows: "The situation is now being reached where the eradication of diphtheria in this country can be foreseen as a very real possibility within the next few years, provided that there is no slackening in the immunization efforts that have been so dramatically successful in the past ten years. A vigorous continued immunization programme, combined with existing methods of epidemic control, may free us entirely from the disease except for the occasionally imported case."

Pasteur once imagined a world from which all other forms

of infective illnesses had been banished by the destruction of the responsible pathogenic organisms. But Pasteur did not know that when one variety of hostile organism is conquered there is a tendency for the balance to be restored by the appearance of a new one. This being so, it is probable that there will always be work for the experts in preventive medicine to do, new diseases having taken the place of those previously eliminated.

The origin of pathogenic organisms

Some bacteriologists believe that the organisms pathogenic to man have been evolved from harmless ancestors. It must be borne in mind that our bodies harbour many bacteria which, far from being harmful, are even useful to us, such as the bacteria dwelling in the large bowel. It is thanks to friendly intestinal bacilli of this kind that herbivorous animals are able to digest the cellulose which is the main constituent of their diet. The help given by intestinal organisms to the white ants is so great that they are able to live on material as indigestible as wood. A great number of micro-organisms live on similar symbiotic terms with their hosts, nourishing themselves on indigestible residues of food and on such occasional delicacies as cells cast off from the mucous linings of their hosts' bodies. But the struggle for survival is as fierce in the world of bacteria as it is in the world of men, and just as hard-pressed human beings sometimes take to racketeering and robbery, so it is likely that certain harmless micro-organisms began to resort to violence. No longer content to live as before on scanty findings in the human body, they contrived methods of attacking its vast stores of living material. They did this first by developing toxins with which to lower their host's resistance and then by launching a direct attack on his tissues.

This theory that predatory organisms have been evolved from harmless ones cannot be proved, but strong arguments can be advanced in its favour. One of these is the close resemblance existing between many harmless bacilli and pathogenic bacilli. For example, the villainous bacillus of typhoid fever so closely resembles those innocent inhabitants of the bowel already referred to, the coliform bacilli, that the two are distinguishable from each other only by means of certain delicate bacteriological tests. This strongly suggests that the typhoid bacillus was evolved from a coliform ancestor. It must be remembered that micro-organisms propagate themselves with prodigious speed, a single organism being capable of producing millions of millions of descendants in the course of a day. This being so, it takes much less time to evolve a new variety of bacillus out of an old one than it would take to produce a new species of animal, a transformation which can only be effected in the course of several million years. Just as the typhoid bacillus resembles the *Bacillus coli communis*, so is the bacillus of diphtheria almost identical with that comparatively harmless inhabitant of the throat known as the diphtheroid bacillus. But it is only fair to point out that there are bacteriologists who do not accept this theory that pathogenic organisms have been evolved out of non-pathogenic ones. They base their objection to it on the grounds that the development of pathogenic capacities is more likely to prove a handicap than an advantage to a micro-organism. In support of this they point out that by developing very deadly properties the cholera vibrio kills its host and thus brings about its own ruin. In the opinion of these bacteriologists, the bacillus of tuberculosis shows a greater wisdom than does the cholera vibrio, for by putting a limit on its capacity for destruction it contrives to live comfortably in its host for many years and gives itself

plenty of time to establish outposts for itself in the lungs of other people. If therefore a saprophytic organism gains no advantage from becoming pathogenic, it is difficult to see how the change from saprophytic to pathogenic could have been brought about by natural selection.

Variations in disease and new forms of disease

Whether pathogenic organisms were evolved from harmless ones or not, there can be no doubt that the world of micro-organisms is in a state of flux, with new forms of life appearing and old forms disappearing. It would be a grave mistake therefore to regard the enemy against which medicine fights as being in a static condition or to conclude that the infective diseases of the future will be precisely the same as those of today. Preventive medicine will have acquired new and powerful weapons, but the enemy will not have been idle. Attention has already been drawn to the fact that the introduction of the antibiotics and the sulphonamide drugs was promptly followed by the appearance of more and more organisms resistant to these remedies. The success of the sulphonamides against the gonococcus had at one time been so great that many doctors believed that gonorrhœa would be eliminated from the earth. But soon it was realized that sulphonamide-resistant forms of gonococci were on the ascendant and that the complete disappearance of this disease was no longer likely.

This does not mean that the races of pathogenic organisms are in a privileged position, and that, unlike human races, they are not tied to a great cycle of birth, youth, maturity, old age, decline and extinction. Some of the illnesses which, fifty years ago, were very vigorous are now showing signs of becoming elderly and decrepit. Scarlet fever is an example of this. When the writer of this book was a child scarlet fever was a disease

dreaded by mothers and nurses, but now it is generally so mild as to be preferable to measles. I have suggested that races of organisms, like races of men, are bound to a cycle of birth, youth, maturity, decline and death, but it is quite possible that there is an entirely different explanation of the reduction in virulence of some of the old infectious illnesses. The more serious forms of cutaneous syphilis and the more deadly types of smallpox, such as hæmorrhagic smallpox, are rarely seen now in this country, and although this is may mean that the spirochætes of syphilis and the virus of smallpox are less vigorous than they formerly were, it is by no means certain that this is the true explanation. The disappearance of the more malignant types of syphilis and smallpox may equally well be explained by the fact that the inhabitants of Great Britain have by now had sufficient time to develop a stronger resistance to the organisms responsible for these diseases. Possibly, not only the sins but also the immunities of the fathers are passed on to the children, We of to-day may be benefiting from the fact that our ancestors suffered from syphilis and smallpox and successfully overcame these infections. That a general increase of resistance may explain a decline in the virulence of an illness is supported by what occurs when the reverse of this happens and a race is attacked by an entirely new form of disease. In the earlier years of the last century outbreaks of measles occurred amongst the Redskins of America, who had never before been exposed to this particular form of infection. The virus of measles fell on virgin soil and because it encountered no resistance, many thousands of the Red Indians died of an illness which, to Europeans, was of a comparatively trifling nature. This does not necessarily mean that in course of time humanity will acquire so strong a resistance to all the infective diseases that these will virtually disappear. It is far more likely that new diseases will appear

from time to time. As mankind becomes *immune to one form* of infection a new one will take its place. It must be borne in mind also that new kinds of illness are continually being introduced as the result of the artificial environment which modern man is contriving for himself. Examples of this will be given later in the chapter dealing with industrial medicine. Man was born to struggle, and amongst the things with which he will always have to contend is illness in its diverse forms.

Changes in diseases due to alterations in the age-constitution of the population

Some diseases are on the decline, some on the ascendant and some are new, for, like everything in the universe, illness is in a state of flux. Whilst gastric ulcers are becoming rarer, the incidence of duodenal ulcers is steadily rising. Leukæmia is five times commoner than it used to be, and cancer would seem to be on the ascendant, and particularly cancer of the lung. But the higher incidence of cancer is partly explained by the increased expectation of life. Cancer is mainly a disease of the later decades of life, and during the last sixty years the age-constitution of the population of Great Britain has undergone a great change. As a result of the measured expectation of life many people who in previous centuries would have died too soon to develop cancer now survive long enough to suffer from it. This ageing of the population will be discussed more fully in a later chapter, and all that need be said here is that in 1891 the under-nineteens formed 45 per cent. of the total population and the over-sixties only 7 per cent. of it, whereas by 1947 the percentage of the former group had fallen to 28 and that of the latter group had risen to 15. It is inevitable therefore that all the troubles from which elderly people suffer, such as cancer, cardiac and renal diseases, bronchitis and rheumatism should be

more prevalent and that juvenile complaints should become correspondingly rare.

Preventive and public health measures can do a great deal to rid us of some of the diseases from which our forefathers suffered, but however successful preventive medicine is, it is unlikely to reduce materially the sum total of ill-health. The planners of the National Health Services Act made the error of being too optimistic about the future of preventive medicine, and it was this that was responsible for their gross underestimation of its financial cost. They assumed that with further advances in preventive medicine and with the earlier and more efficient treatment of diseases, the incidence of ill-health would steadily decline. They failed to realize the fact that medical treatment is and has always been highly selective in its action and that doctors are much more successful in curing acute forms of illness than they are in curing chronic forms of it. All that we doctors usually manage to do is to patch up people suffering from chronic illnesses and thus to prolong their lives. Because our relieved but uncured patients still continue to require medical treatment, we increase instead of diminish the financial liabilities of the State. For this reason and for several others besides, the cost of the National Health Services will continue to rise. Until a government appears that is sufficiently strong and realistic to place a limit on it.

Preventive medicine on a world scale

It is comforting to know that although the world is noisy with political and economic strife, and is in a state of suspended war rather than of peace, a few world-wide associations have come into being and are contriving to survive. Amongst such international bodies is the World Health Organization, usually known by its initials W.H.O. In spite of the fact that

the Soviet Union, its European satellites and China stand outside this organization, it is managing to do excellent work. That a world-wide health organization of this kind has now become essential is obvious to anyone unblinded by political prejudice. The speed of travel, the growing dependence of one nation on another and the ubiquity of disease have produced health problems which can only be solved by world-wide co-operation. A modern aeroplane can transport mosquitoes infected with malarial parasites from one country to another within a few hours. A child with unsuspected poliomyelitis or an adult with smallpox can carry infection with similar speed to another continent. Epidemics are able to spread far more rapidly than they previously did, and the mere existence of a World Health Organization is a continual reminder to us that health problems are no longer the concern of nations, but of the whole world. The W.H.O. is carrying out large-scale experiments in epidemiology, in sanitation and in new forms of medical treatment. It is also aiding backward countries by giving them the advice and the medical equipment that they lack. So vast has the scope of the W.H.O.'s work now become that it can no longer be controlled, as formerly, from its central office in Geneva, but has required the establishment of six additional headquarters in Africa, the Americas, South-east Asia, the eastern Mediterranean and the western Pacific.

In its 1951 report the W.H.O. announced two health projects on which it was about to embark. The first was a crusade against "yaws," a tropical disease which gives rise to sores very similar to those appearing in the tertiary stage of syphilis. Everybody exposed to this form of infection—and many of its victims are children—was to be examined and, if found to be infected, treated with penicillin. Over half a million

people have already been dealt with in this way, chiefly in Thailand and Indonesia. Inspection and treatment is being carried out by local teams working under the supervision of experts. The W.H.O. is interesting itself in another subject of still greater importance. An attempt is now to be made to investigate and to deal with, so far as is possible, that immense menace, over-population. It is felt that even if this complicated task meets with only a limited success, it will provide valuable data on which future plans can be based. It will also reveal the state of maternal health and child welfare in these countries.

That the W.H.O. should survive and prove a success is of immense importance to mankind. If it fails and has to be dissolved, it will mean that men have not yet reached that stage at which it is possible for them to work together for the common good. In other words, it will confirm Sir Charles Darwin's view of men, expressed in his book, *The Next Million Years*, that they are "wild and untameable animals." If, on the other hand, the W.H.O. succeeds, then another stone will have been added to the, as yet, shaky foundations on which new forms of world co-operation can be built. The W.H.O. is a testing-ground for mankind and the issue of the test still hangs precariously in the balance.

The future of preventive medicine

As the meteorologist bases his weather forecasts on barometric readings and on the movements of areas of low and high pressure, so also must any forecast in medicine be based on present movements within the field of medicine and in the greater world outside it. The most obvious movement in world politics and economics is the increase in the power of the State and the corresponding shrinkage in the liberty of the individual. The State is assuming more and more of the

responsibilities which formerly belonged to the private individual and is growing in power at the expense of personal freedom and initiative. That State control should increase is inevitable. The more densely a country is populated, the more necessary does it become for it to be highly organized, but, alas, State control always breeds more State control. Now that the government has made itself responsible for the treatment and maintenance of the individual during periods of ill-health, it has the right to demand that he should live in accordance with what it regards as being health-giving principles. So the likelihood that the State will decide more and more what we shall do and what we shall avoid doing must be accepted. The individual will continue to protest against this growing interference with what he considers to be his private affairs, as his forefathers protested, in the past, against such innovations as compulsory schooling and public health legislation, but discovering, as they did, that the new regulations bring with them certain advantages, he will become resigned to them. This has been the history of all public health measures in the past, and it is likely to be their history in the future.

The scope of preventive medicine will increase and more and more medical men will be drawn into the government offices concerned with it. In course of time private practice may almost entirely disappear, owing to the fact that the vast majority of doctors have become State officials. As such they will forfeit the popularity they formerly enjoyed. An official is an official even when he happens to possess a medical qualification, and officials are curtailers of liberty. The State doctors attached to the Ministry of Health will be compelled to pry into the most intimate secrets of their fellow countrymen's lives. They will develop clear-cut views of what is conducive to other people's health and what militates against it, what habits

are social and what are anti-social, what people should eat and drink and what they should avoid eating and drinking. In short, they will pass judgment on a number of activities that have hitherto been the concern of the individual alone. New sanitary laws will have to be obeyed, more government forms filled in, fresh regulations observed and more and more conditions satisfied. The doctors of the future cannot expect to be popular.

As the activities of the preventive department of the Ministry of Health increase, so also will its ancillary services have to be enlarged. Health education will become of greater importance, and because, by that time, all patent medicine vendors will have been driven out of business, private advertisements will be replaced by government posters encouraging everybody to live in accordance with the sound hygienic principles officially laid down. Hints on the conservation of health, warnings against anti-social habits, reminders that periodic medical examinations are obligatory and that certificates of attendance are now required will all help to maintain the health consciousness of the public. In the filing cabinets of the Ministry of Health careful records will be kept of everybody's past medical history, of the preventive inoculations that he has already received and of the date at which these will have to be repeated. Not only will visas be required for foreign travel, but also certificates from the sanitary officers.

Mental health

Mental health being inseparable from somatic health and the State having assumed charge of the one, it will be entitled to supervise also the other. But here the difficulty referred to in Chapter I arises. Whereas it is comparatively easy to establish a standard of health for the body, it is quite another thing to arrive at a standard of health for the mind. What aggravates

this difficulty is that a standard of mental health approved of by the State is not necessarily the same as that which would be favoured by a private individual.

Character is moulded in childhood, and an all-powerful government, interested in the psychological health of its citizens, will undoubtedly insist on being responsible for the upbringing of the young. Instability of the home background is conducive to the subsequent development of a neurosis, and a government would have every excuse for preventing this by removing children from ignorant and unreliable parents and bringing them up in accordance with the sound psychological principles established in State nurseries and schools. Now, governments resemble big businesses in that they show a preference for standardized goods, and this being so, departures from the accepted pattern of behaviour would be unpopular in Whitehall. Poets, geniuses, saints, free-thinkers and other eccentrics tend to give trouble, and for this reason originality and independence of thought would be frowned on. In the State nurseries and schools, the conventional and the obedient child would receive every encouragement. There could be little difficulty in rearing children in accord with the required standard pattern. Aldous Huxley has given us a graphic account of the conditioning of children in *Brave New World*, and all that need be said on this subject here is that the child's mind provides ideal material for the conditioner's work. This is a truth which the totalitarian countries have long ago recognized and acted upon. Not that the democracies of the future, if they manage to survive, will necessarily become as unscrupulous as the police states are, in this matter. All that is being implied by the foregoing remarks is that a government which has made itself responsible for the bodily health of its citizens will also make itself responsible for their mental health, and that

this of necessity entails control over the upbringing of children. The fact that the family is a biological unit and that no government official can ever act as a satisfactory psychological substitute for the father and mother will be only too easily forgotten.

Chapter XII

THE ANTI-TUBERCULOSIS CAMPAIGN

As has been repeatedly stressed, the causes of disease are usually multiple, a fact that is rarely appreciated by the public. A patient often inquires of his doctor, "Why have I contracted this illness?" and expects to receive a clear and simple answer to his question. He anticipates that the doctor will say that it was because he has been attacked by a germ, or that he caught a "chill" from going out into the night air without his coat, or that he ate something that did not agree with him, or that he overworked and thereby overstrained his heart. The patient has every right to enquire what is wrong with him and why he is ill. It is the unknown that frightens us, and a patient is comforted by the thought that he now knows the precise cause of his illness, however inadequate the proffered explanation happens to be. More often than not the doctor himself does not know why the patient has become ill. He may be able to identify the organism by which he is being attacked, be capable of giving a name to the illness and guess what were the factors that were responsible for the lowering of his patient's resistance, but he cannot really explain why a particular individual has become a victim of a particular disease. Yet for the sake of his patient's peace of mind he is often compelled to unfold a tale, of the veracity of which he himself has the strongest doubts.

In the last chapter a general survey was made of the subject of public health, and in this one the principles of preventive medicine will be illustrated by selecting a common disease and

discussing what can be done to prevent its spread. The disease which will be chosen for this purpose is the well-known one, tuberculosis. Although the chief emphasis will be placed on its prevention, something will also be said about its cure, for prevention and cure are but two different aspects of the one art of medicine. It is quite obvious that the more thorough the treatment of a patient suffering from a contagious disease, the less likely is that disease to spread. Before discussing the special measures that have been adopted in the anti-tuberculosis campaign, something will have to be said on a subject which has a bearing on all diseases, the subject of nutrition. In the case of tuberculosis, the state of nutrition of the patient prior to infection is of particular importance.

Nutrition

Those two Horsemen of the Apocalypse, Disease and Famine, always ride alongside each other, lending each other mutual support. Famine encourages the outbreak of disease, and widespread disease is frequently followed by famine. This being so, a government that has taken upon itself responsibility for the health of its citizens must also hold itself responsible for their nutrition and for the nation's food supply. As will be shown later in this chapter, the better feeding of children has probably done more to reduce the incidence of abdominal tuberculosis, a disease to which they were formerly prone, than has any other health measure. Better nutrition has also led to the decline of such childish and adolescent troubles as rickets and chlorosis. But gratifying though this be, much still remains to be done by better attention to diet. Dental surgeons are convinced that dental caries could be reduced by at least 50 per cent. by a further improvement in the feeding of children. Dental caries is one of the deficiency diseases, and modern methods of

milling are to a great extent responsible for it. The overheating caused by the high-speed steel rollers used in modern flour-mills destroys the most valuable part of the grain, the wheat-germ containing all its vitamins. Because overheated wheat-germ causes fermentation of the flour, it is removed from it. Having allowed the millers to eliminate in this way the most valuable part of the wheat, the private individual is compelled to make good what has been lost by purchasing vitamins from the chemist. But it is an ill wind that does nobody any good, and not only the chemists, but the dentists as well reap rich harvests from our modern methods of milling. The vogue for the white loaf is likely to continue.

But if the State assumes still greater control of its citizens' health, surely government officials will have to pay more attention to the question of nutrition, and in the end forbid the removal of vitamins from flour. So also will the official nutrition experts of the future be wise to investigate carefully the methods now being used for the preservation of food. Purveyors of food are concerned only with how best to preserve food, and they do not bother to investigate too carefully whether the chemicals they use for this purpose have any adverse effect on the consumer's health. Herein lies another rich field for a scientific inquiry by unprejudiced experts and for the issuing of a report on modern methods of preserving food. Such an inquiry has become particularly necessary now that "processed" and tinned foods make up perhaps a quarter of the average family's diet. It is an investigation also which would be particularly appropriate to a country that is forced to import a large percentage of its food. Having discussed nutrition we can now pass to a consideration of tuberculosis.

The High Incidence of Phthisis in the Past

Modern readers of early Victorian novels are inclined to smile at the frequency with which the novelist's heroines went into a "decline" and faded away like withering flowers. Nor was it only the young women who wilted in this strange way. Young male geniuses were equally liable to be struck down in their prime and to be lost to the world before their masterpieces had been composed, painted or written. But at the time at which these novels were being written the danger of this happening to young people of both sexes was a very real one and was not merely a convenient method of getting rid of characters no longer required. Beautiful young women and poets of genius did actually go into a decline and die of consumption. In the year 1850 12 per cent. of all deaths were due to phthisis, and this meant that 460 out of 100,000 young women and 400 out of 100,000 young men died annually of this disease. Since then the death-rate from tuberculosis has been steadily falling, and during the last fifty years the downward sweep of the mortality curve has become more abrupt. So marked has the decline been during the last twenty years that articles now appear in medical journals with such optimistic headings as "The Conquest of Tuberculosis" and "Is Tuberculosis Disappearing?" The correct answer to the latter question is that tuberculosis is in process of declining, but that it is not likely to become a rarity for many years to come. And what is true of phthisis is also true of other forms of tuberculosis, such as the abdominal form of tuberculosis to which children are particularly liable. The following table, taken from an article, written by Dr. F. A. H. Simmonds and published in the *St. Bartholomew's Hospital Journal* of May, 1952, shows the fall in the incidence of this abdominal variety of tuberculosis during the last twenty-three years:

ABDOMINAL TUBERCULOSIS

Death Rates per million children under five

	1921	1930	1938	1944
London Administrative County	136	24	12	6
Combined county boroughs	437	157	63	35
Combined rural districts	252	92	63	60

To what is this marked drop in the death-rate in abdominal tuberculosis due? The source of infection in this variety of tuberculosis is usually milk containing live tubercle bacilli. Cleaner milk is therefore partly responsible for the decline in abdominal tuberculosis. But as diseases are usually due to several causes, cleaner milk does not entirely explain it. It is the result of many advances; of earlier diagnosis and of improved methods of treatment; of the purer milk coming from hygienic dairies; of the great increase in the number of tuberculin-negative herds to be found in this country and of the prompter slaughter of tuberculous cows. In other words, the fall in the number of deaths due to abdominal tuberculosis is an excellent example of how much can be done by simultaneous advances along the two parallel roads of curative and preventive medicine. So marked has the fall in the incidence of this disease been that in London hospitals this childish variety of tuberculosis, due to infection from a bovine source, has become a pathological rarity. Nowadays it is seldom seen by medical students, whereas fifty years ago at least one case of tuberculous peritonitis was to be found in the children's ward of every big hospital. Many doctors believe that if the pasteurization of milk had been made a compulsory measure the improvement would have been even greater. This is quite possibly the case. It must be remembered that milk coming from a number of different sources is pooled and

this means that the advantages of milk obtained from tubercle-free herds is to a great extent lost. Little of the food value of milk is destroyed by pasteurization, but for some unknown reason the Ministry of Health has always refused to make pasteurization compulsory.

Public health measures, in the broadest sense of those words, have also brought about a great decline in the incidence of that commoner form of tuberculosis known as phthisis. The general rise in wages and a much higher standard of living have played a very large part in the fall of the mortality rate from phthisis. Hart and Wright have shown that the incidence of phthisis varies inversely with the breadwinner's wages, and the fall in pauperism, supplemented by the provision of free meals and milk to schoolchildren, have been important preventive measures in the anti-tuberculosis campaign. But, excellent though the results have been, there still remains a great deal to be done, and particularly with regard to better housing. Phthisis is a contagious disease, and the overcrowding that is so prevalent at the present day, on account of the housing shortage, encourages its spread. It probably explains why the incidence of phthisis remains highest in the slum areas of our great cities, where the overcrowding is such that several families may be herded together in two or three rooms.

Twenty-three years ago the *case* mortality from phthisis seemed to be remaining stationary, even although the *total* mortality rate was falling. This meant that in spite of the reduced chances of any one person's becoming infected, his chance of recovery should he be so unfortunate as to contract the disease, was no better than it had been in previous years. Fortunately, the prompter and better methods of treatment that are available to-day, in other words, the advances in curative medicine have made this no longer true. Nowadays

the case, as well as the total, mortality rate is falling, and it is likely to fall still more steeply in the future.

Diagnosis

Early diagnosis is of the greatest importance in the anti-tuberculosis campaign, and the stethoscope is no longer a sufficiently sensitive instrument for the early detection of pulmonary tuberculosis. By the time that alterations in the chest sounds can be heard the disease is already well-established. An X-ray photograph is a far more efficient discoverer of the first stages of phthisis, and the routine radiographic examination of everybody who has been in contact with an established case of phthisis, and of those who are engaged in occupations carrying with them an increased risk of tuberculosis, such as mining, has revealed many unsuspected cases of the disease. By these routine examinations it has been discovered that three out of every 1,000 apparently healthy individuals are actually suffering from early phthisis. Because segregation is an important item in the anti-tuberculosis campaign, these X-ray examinations are of great importance. They have sometimes been the means of bringing to light what may be called a minor epidemic of tuberculosis. It has brought to light, for example, the fact that a schoolteacher who suffered from an unsuspected focus of infection in his lungs had passed on the disease to a number of his pupils. But unfortunately there are people who do not avail themselves of this new facility for the early detection of tuberculous infection. They dread that they may be unlucky enough to find that they have contracted tuberculosis, and because they regard this as tantamount to receiving a death-warrant, they prefer to run no risk of being placed in this tragic position. They are making a serious mistake, for nowadays a diagnosis of early pulmonary

tuberculosis does not mean what it formerly did. With prompt and early treatment, the outlook for recovery is excellent. The discovery of streptomycin, as well as other advances, both medical and surgical, have entirely altered the outlook for those suffering from early phthisis.

Sanatorium treatment

Tuberculosis differs from the majority of other infective diseases in its chronicity and in its tendency to relapse, and because of this its treatment requires a well-drawn-up plan of action, as well as a long period of expert supervision. Haphazard and spasmodic treatment is likely to result in an incomplete cure—that is to say, improvement—followed in course of time by a setback in the shape of a relapse. This is one of the reasons why sanatorium treatment, at any rate at the start of the trouble, is of particular value to a patient. In a sanatorium a patient learns a good technique of living which he can continue to follow when it is no longer necessary for him to remain there. Expert medical supervision is required by the patient, not only during his illness, but also subsequently after he is presumed to have been cured. Because of this proneness of tuberculosis to relapse, a patient should be re-examined from time to time after he has received his discharge and has started to work again.

Sir Pendrill Varrier-Jones, the founder of the Papworth Village Settlement for tuberculous patients, writes of this later period of a patient's career as follows: "I had been taught, and the text-books were full of it, that a consumptive should obtain a light job in the open air. . . . I had been taught that a nourishing diet was absolutely essential . . . that fats, preferably cream, should be liberally served, and that altogether a generous diet should certainly be prescribed. . . . I advised all this

and yet little success attended my efforts. The patients returned again and again for further examination and advice. They lost weight; very soon their general condition was worse than before they were sent to a sanatorium. Why did this state of affairs exist? I put the question, and in time I got my answer."

What was this answer? It was to the effect that "light jobs in the open air," sufficiently well paid to defray the expenses of cream and the other ingredients of a generous diet, "are as rare in this country as crested wrens. Work in the open air is usually exceedingly arduous, and light jobs, when they are to be found, are usually to be found in big industrial cities and are not very well paid." Varrier-Jones' method of overcoming all these difficulties was to construct for his patients the environment which they needed on completion of their sanatorium treatment. On the Papworth Estate a village eventually sprang up—a village which possessed its own workshops and industries—and when this model colony had been completed its founder had the pleasure of witnessing the great improvement which took place in his patients' minds and bodies now that work and hope had been added to their régime. An immense change was noted in their morale, for his ex-patients no longer looked upon themselves as being unemployable consumptives, but felt they were men who had a place in society and who took a pride in their work. Papworth provided a model for the founding of other centres elsewhere, both in England and abroad. It was, and still is, a very successful experiment in the handling of tuberculosis.

Medical and surgical methods of treating phthisis

The main items in the sanatorium treatment of patients are fresh air, good food, rest and graduated exercises. Whilst fresh air is of importance to the patient, it must be borne in mind

that air is not in itself a bactericidal agent. By this is meant that air, however excellent its quality, does not destroy tubercle bacilli. To send, therefore, a consumptive abroad—say, for six months' rest in Switzerland—in the hope that the mountain air will do all that it is necessary for his recovery is a mistake. Actually the incidence of tuberculosis amongst the Swiss is higher than it is in Britain, and excellent arguments can be advanced in favour of a consumptive being treated in the climate in which he will have to live and work after he has received his discharge. It is not to Switzerland, but to this home environment that he will have to adjust himself.

Medical and surgical advances in treatment

The most noteworthy advance on the purely medical side of treatment has been the discovery of streptomycin, and in many sanatoria up to 90 per cent. of patients are treated with this antibiotic. Used in conjunction with complete rest in bed, it often leads to a disappearance of the fever from which the patient has previously suffered, and to a marked improvement in general health. But streptomycin should not be regarded as a cure; it is only a valuable aid to that end.

Advances have also been made in the surgical treatment of the disease. The aim of surgical measures is to put the affected lung at rest and to give it a better chance, first, of overcoming the infection and, second, of repairing the damage that has been done by it. The immobilization of the lung is brought about by creating what is known as a pneumothorax, that is to say, by collapsing it. Gas is introduced into the space between the lung and the chest-wall so that the lung no longer expands when the ribs are raised. In cases of a more serious nature a number of ribs are removed from the side of the chest, so that its capacity is reduced. The modern chest surgeon is equipped

to undertake far more formidable operations than these—such operations as the removal of an infected lobe, or even of a whole lung. These more serious operations are not often performed owing to the fact that when the disease has progressed so far as to justify carrying them out, doubts are often felt as to the state of the lung on the opposite side.

Lessons to be learnt from the study of tuberculosis

Certain general principles which are applicable to other diseases can be drawn from this study of tuberculosis. One is that if a disease is to be dealt with efficiently, there must be close co-operation between a number of different people—in the case of tuberculosis between the sanitary, the housing and the local authorities, the officials of both the Ministry of Health and of the Ministry of Labour and the various members of the medical profession who are attending the patient. In the past many valuable institutions such as the Papworth Village Settlement were started as private enterprises supported by voluntary contributions, but now that they have been transferred to the State, a close liaison between the various officials concerned is essential. At present this is often lacking, so that much valuable time may be lost in making the necessary arrangements. Another conclusion to be drawn from the study of tuberculosis is that the preventive measures adopted must be both comprehensive and thorough if the incidence of the disease is to be effectively reduced. This was illustrated by the wide range of measures used in the campaign against abdominal tuberculosis. It will be recalled that these measures included the better feeding of children, the progressive reduction of tuberculosis in dairy herds and the institution of more hygienic methods of collecting and of distributing milk. A third general principle which can be drawn from the study of tuberculosis is so obvious

that it need scarcely be pointed out again. It is that the earlier a disease is diagnosed, the better is the prospect of curing it and the less likely it is to spread. The fourth and final one is that it is not enough to cure a patient of his disease; he must be assisted also to return to an active life and to earn his own living. Otherwise he will be in danger of joining the fraternity of the unemployed and the unemployable.

Rehabilitation

It is the last of these requirements that presents the greatest difficulty at the present time. Whereas much good work has been done to assist the rehabilitation of mutilated and blinded Service men, very little has been done as yet for the convalescent civilian. Should his sickness have left him less efficient than he formerly was, he has the greatest difficulty in finding a new job. Not that the employer of labour is necessarily to be blamed for this. Compelled as he is by trade union regulations to pay a standard wage to all his employees, it is to his disadvantage to engage a man whose working capacity is reduced when for the same outlay he can obtain the services of one who is 100 per cent. efficient. At the same time, employers of labour are not always free from prejudice on this subject. Some of them look upon a man or woman who has been ill with strong disfavour. In a book recently published on the problem of the sick citizen, the story is told of an epileptic bank clerk who had been employed for over thirty years without it ever being known to the management that he suffered from epilepsy. This was due to the fact that his seizures invariably occurred in the early morning before he left his home. One day a fit occurred much later than usual, and he was immediately discharged, in spite of his previous excellent service. There are, of course, occupations for which an epileptic

is completely unsuited, however rare his seizures may be—such occupations as driving a lorry or managing a machine—but work in a bank is certainly not one of these.

The fault sometimes lies with the convalescent rather than with the employer of labour, for a prolonged stay in a sanatorium or hospital has a demoralizing effect on many patients. They are apt to become hypochondriacal, and so dependent on other people that they lose all desire to stand on their own feet and return to work. Their illnesses have become the axes around which their lives revolve, and so long as they can be maintained by a hospital or some other institution they are unwilling to fend for themselves. Even if they were to be given a suitable job, their illness has supplied them with an ever-ready excuse for absenteeism. Doctors and nurses who work in hospitals are very familiar with patients of this kind. Invalidism only too easily degenerates into parasitism and the unemployable, hospitalized patient is a very real problem to any nation struggling for economic survival. It is, moreover, a problem for which it is difficult to find a solution, the hospitalized patient being a man whose mind has been as adversely affected as his body. He has no desire to get well and therefore is possessed of no incentive to find work. In a recent discussion on industrial resettlement at the Royal Society of Medicine, Dr. Fagger drew attention to another reason for a convalescent patient's dislike for returning to work. He cited the case of a workman who had previously been a sewage worker strained a muscle of his back, for which he received adequate treatment and from which, so far as could be seen, he had completely recovered. For two years he has remained unemployed and has made no attempt either to return to his old job or to find a new one. As an unemployed man, he receives weekly the following grants.

	£	s.	d.
Unemployment Benefit.	3	7	0
National Assistance Board Allowance	2	14	0
Family Allowance.	1	10	0
Ministry of National Insurance Special Hardship Allowance	1	0	0
Total	£8	11	0

(*Proceedings of the Royal Society of Medicine*, September, 1952.)

What financial incentive has such a man as this to work, or to admit that he has recovered sufficiently to work?

It was said in Chapter VI that a ceaseless warfare is waged in the unconscious regions of the mind between a positive, creative force and a negative, destructive force, and the hospitalized man we are now discussing remains permanently in the power of the latter. He has lost all desire to create anything at all, not even his own happiness and health. These self-destroyers are to be found in every section of society, and amongst the leisured as well as amongst the labouring classes. The only difference between them is that the invalidism of a member of the leisured class is less apparent, thanks to the fact that his financial resources permit of his contriving an environment in which he finds it possible to live.

The Ministry's Report on National Health

The following figures extracted from Sir John Charles' 1950 survey of the state of health in this country during the last fifty years indicate how great has been the progress in preventive medicine during the last half-century. The death-rate from phthisis is now less than a quarter of what it was in the

year 1900. The fall in the mortality rate of other forms of tuberculosis is even greater—namely, one-thirteenth of the mean rate during the years 1891 to 1900. The general mortality rate for tuberculosis is the lowest that has ever been recorded.

The figures for diphtheria are even more striking, the death-rate for this disease in 1950 being only 2 per cent. of what it was during the period 1937 to 1941. Sir John Charles is optimistic also about infantile paralysis. Despite the recent epidemics of this distressing trouble, the prospects of patients suffering from it recovering are steadily improving. In every 100 patients admitted to hospitals during these recent epidemics only five or six have died. Of those who recovered, nine or ten were left with a severe degree of paralysis, seventeen recovered sufficiently to allow of their subsequently earning their living and the remaining sixty-five were either free of all disabilities, or else were penalized only by some trivial form of paralysis.

The only unfavourable item in Sir John Charles' Report is the increase in the incidence of coronary thrombosis and cancer. The first of these diseases has already been dealt with and the rise in the incidence of cancer will be discussed in Chapter XIV. The spectacular rise of cancer of the lung is a puzzling feature in the report, and one of the explanations offered for it is the increase in cigarette smoking. Whilst this may well be a factor in the causation of lung cancer, it is unlikely to be entirely responsible for it. As has frequently been pointed out, the causes of ill-health are multiple rather than single, and this is particularly true of cancer. Little has been learnt from the intensive study of cancer, but one of the things that research has shown is that its causes are even more complex than they were formerly believed to be and until more is known on this subject little or nothing can be done in the way of prevention.

Chapter XIII

INDUSTRIAL MEDICINE AND EPIDEMIOLOGY

HEALTH was defined as an inner balance of functions and an ability on the part of the organism to adapt itself to its environment. The wider the range of adaptability and the more promptly it is made, the healthier the organism. Some people are only able to retain their inner balance by manipulating their environment, and in the first chapter an instance was given of a clerk who compensated for his cardiac disease by this means. Examples were also given of people who only succeed in maintaining their mental poise by retiring from the world and leading sequestered lives. Such people as these cannot be regarded as healthy for they are adapting their circumstances rather than themselves. It may be said that the chief aim of Western man is to gain sufficient control over his environment to be able to mould it to his needs and live more comfortably. He has been remarkably successful in doing this, thanks to the discoveries of the scientists. The wealthier classes in America live in centrally heated and air-conditioned houses, and with the help of radiators in the winter and of refrigerators in summer they are relieved of the necessity of adjusting themselves to changes in temperature in their homes. The more civilized the nation the more artificial is the environment it creates for itself and the more difficult it becomes for its members to adjust themselves to natural conditions.

Whilst most of us have sought to adjust outer conditions to our requirements, a very small number of exceptional individuals, usually regarded as eccentrics by their fellow men,

have reversed this order and have aimed at gaining control over themselves. This tiny minority is composed of the world's saints, yogis, fakirs and stoics, men who believe that it is far more important to be master of oneself than of the world in which one lives. The capacity of the body to adjust itself to external circumstances is much greater than Western medicine realizes. This is a subject which has never been studied in the West, but which is dealt with in hatha yoga, a special branch of the ancient science of yoga. It has been reported by reliable authorities that certain Tibetan yogis are capable of removing their clothing when the outside temperature is well below zero and of sitting there in the night air wrapped in sheets which are kept wet by disciples pouring water over them. By means of some inner manoeuvre which they have learnt, they are able to turn on what is known as the "celestial heat" and are none the worse for this trying exposure. Now, I am not suggesting that Westerners should attempt to imitate such heroic feats as these—they are done by yogis for other purposes than display but I am describing them in order to support my thesis that man possesses great powers of adaptability which are capable of development by certain methods. We ordinary people who have no knowledge of body control must begin on a much lower level than this. For example, we can start by refusing to accept the many absurd suggestions by which we bind ourselves, such as that whenever we sit down on damp grass, we are bound to develop rheumatism, or that if we go out at night insufficiently clothed we are incurring a grave risk of dying of pneumonia. It is quite true that if we become tense, miserable and fearful on discovering that the night is colder than we expected it to be, our resistance to disease is lowered immediately, but it would be absurd to blame the night air for any illness we subsequently developed. Fear and

anxiety are far more potent causes of illness than are humidity of the atmosphere and a low temperature. Our tissues contain over 70 per cent. of water, and it would indeed be remarkable if a slight increase of moisture were to endanger our health.

In his passion for altering his outside circumstances and rendering his life more comfortable man sometimes contrives an environment which is inimical to health. There are illnesses for which our present form of civilization is directly responsible. An industrial worker may be condemned to spend a third of his life in the unnatural conditions of a work-shop, or factory in which poisonous chemicals are being used and the miner is called upon to live in the entirely artificial surroundings of the mine. Men who live in such environments as these are exposed to risks unknown to primitive man and may develop illnesses from which he was exempt. Amongst these modern occupational and industrial diseases are painter's colic, miner's nystagmus, pneumoconiosis, chimney-sweep's cancer, weaver's bottom, diver's cramps (otherwise known as caisson disease), writer's cramp and patellar bursitis, or housemaid's knee. Some of these illnesses result from the excessive strain imposed on a particular organ or tissue, others from the cramped position in which the labourer is compelled to work, and yet others to the chemicals he handles.

That a man's method of gaining his livelihood has an important bearing on his health is shown by the table on page 187 in which the standard mortality rates for men engaged in various professions, trades and industries are recorded. It has been taken from the Registrar's Decennial Supplement for England and Wales in 1931.

It will be noted that much the highest mortality rate is that of the tin- and copper-miners—a fact that is almost entirely

<i>Occupation</i>	<i>Mortality rate</i>
All occupied males	100
Teachers	68
Clergymen	69
Agricultural labourers	77
Electrical workers	90
Fishermen	96
Textile workers	105
Doctors	106
Coal-miners—hewers and getters	113
Dock labourers	137
Underground tin- and copper-miners	342

due to their great liability to develop pneumoconiosis, a disease caused by the inhalation of dust. We can attribute the high mortality rate of the dock labourers to the heaviness of their work and to the strain imposed on their hearts. It will be noted that the risks attached to the learned professions are very different. The mortality rate amongst clergymen and schoolmasters is low as compared with that of the doctors because their work is less arduous, is associated with less anxiety and is restricted to limited hours. The clergy and the schoolmasters are poorly remunerated, but they are compensated for this by the prospect of enjoying a long lease of life.

Industrial efficiency and justice both demand that diseases due to the nature of a man's occupation should be carefully investigated and whenever possible prevented. This is being done and so important has the study of occupational diseases become that it is now a specialty in medicine. Industrial disease has also been the subject of a considerable amount of legislation. A number of factory laws have been passed in order to safeguard the health and the interests of industrial workers and

to protect them from the special risks attached to their occupations. Some of these laws must now be considered.

Legislation relating to industrial diseases

The first Act for the protection of the manual worker to be placed on the Statute Book was the Health and Morals of Apprentices Act, passed as long ago as 1802. This was followed by the Factory Inspectoral Act of 1833 and the Mines Inspectoral Act of 1850. They mark the beginning of public and legal interest in the subject of occupational diseases, but neither of these Acts, nor the Factory Inspectoral Act of 1837, did very much to improve the lot of the factory worker. At the beginning of the great Industrial Revolution the conditions under which factory hands worked—many of them children—were truly appalling. Little though the Factory Inspectoral Act of 1837 achieved, it was a sign that public opinion was beginning to realize the need for protecting the health of factory workers. The Act required of managers that they should report to the authorities illnesses of an industrial nature. The original list of notifiable diseases was a very short one, but in course of time, other diseases were added to it. At the present day it embraces the following:

Lead poisoning,
Arsenic poisoning,
Mercury poisoning,
Phosphorus poisoning,
Chronic benzene poisoning,
Aniline benzene poisoning,
Carbon disulphide poisoning,
Epithelioma ulceration poisoning,
Chronic do.

Caisson disease amongst divers,
Toxic jaundice,
Toxic anæmia,
Anthrax.

Increasing recognition of the fact that occupation and health are closely connected eventually led to the appointment of medical men whose duty it was to look after the physical and the mental welfare of the employees. At the present time there are as many as 1,800 of these factory doctors in Great Britain. They have the following duties:

1. To examine and to report on the suitability of new applicants for employment in the industry.
2. To carry out periodic medical examinations of those engaged in the more dangerous trades.
3. To report and to investigate all cases of notifiable industrial diseases.
4. To examine and supervise workers who have been absent on account of either illness or accident and who are now resuming their work.
5. To give first aid in all cases of sudden illness or of accidents in the factory.
6. To advise the management on such subjects as hygiene, accident-prevention and health legislation.
7. To supervise the factory canteens and to keep an eye on the quality of the food served in them.
8. To give talks to the workers on the maintenance of their health.
9. To draw up an annual report on the health of the employees.

Since the passing of the National Insurance (Industrial Injuries) Act of 1946 and of the Disabled Persons (Employment)

Act of 1944 the duties of these factory doctors have been still further increased. They serve on medical boards and on the medical appeal tribunals appointed to assess disabilities and to settle claims for compensation. Their advice is also sought on such subjects as work conditions and the morale of the workers.

The morale of the factory hand is of great importance to industry, for it has been estimated that the output of a factory is only from a half to three-quarters of what it would be if everyone were to work at full pressure. Many suggestions have been made for increasing the output of factories, and, amongst others, the suggestion that wages should be raised or bonuses granted. Now it is true that increased pay might have a temporary stimulating effect, but it is also true that a healthy and contented man or woman does not, as a rule, enjoy idleness. A fall in the output of a factory below a certain level is therefore an indication to factory managers that it would be wise to examine carefully the conditions under which their employees are working. The great majority of managers realize this, and many interesting discoveries have resulted from their periodic surveys of factory output and its relationship to working conditions. One important lesson that has been learnt in this way is that it is profitable to employ men for only so long as they are working at their best. After this optimum period has been passed, their continuance at work is uneconomical. It has not yet been possible to establish what is the optimum working week for a factory, but it has been found that few employees are capable of working for so long as a sixty-hour week. The forty-eight-hour week suggested by some of the trades unions, is, on the other hand, too short a week to be countenanced by a country in such an unsatisfactory economic state as Great Britain. It is not in any way surprising that factory hands

should clamour for fewer hours when the extreme monotony of much of the work they do is borne in mind. It often consists in repeating the same movement for hours on end and in continuing to do this throughout the whole of the five to five and a half days' working week. Work of such a nature as this is utterly demoralizing, and it is difficult to see how the machine-tender can do otherwise than watch the slow progress of the hands of the factory clock and long for the time of release. Samuel Butler was far-seeing when he warned us against the tyranny of the machines and the risk of our becoming their slaves. They have already gained the mastery over many human lives.

Conditions of work

In spite of the impossibility of eliminating the monotony of the factory hand's work, a great deal can be done to make things easier for him and thus increase factory output by attending to a number of small details. Lighting and ventilation are important points, and it is above all necessary to ensure that the workroom is kept at an equitable temperature. Fatigue can also be reduced by providing employees with seats whenever their work allows of their using them. Every effort must also be made to avoid the necessity of their working in cramped positions. Because many factory workers suffer from some minor form of neurosis, it is a great advantage that a factory doctor should possess a good working knowledge of psychology and be *persona grata* with the workers.

The importance of the factory doctor's work

Attention has been directed to the special work of the factory doctor because, in the opinion of the author, it has a

bearing on the future of medicine. The importance of his work is likely to increase. He is particularly well placed for studying the ebb and flow of health in a community. He carries out routine examinations of a large number of nominally healthy people and can study the effect of their environment on their physical and mental well-being. His position is therefore very similar to that of the resident staff of the Peckham Health Centre, whose work on minor fluctuations in health formerly provided medicine with such valuable information. Another reason for believing that the factory doctor's work is of importance is that it is likely to expand and to become an integral part of any future state medical service. The tendency is for industry to be controlled by larger and larger companies and these great industrial combines possess immense financial resources. Aware as they are that a satisfactory output can only be maintained if the employees are both well and contented, they take a very keen interest in all problems of health. It is highly probable therefore that the factory medical services will become even more efficient in the future than they are at the present time, and that a close liaison will be established between them and the hospitals and public health authorities. This will be all to the good, for it will have the effect of bridging some of the gaps which at present exist between one health service and another. It is in this fashion, by slow natural growth and by give and take, that hitherto all our British institutions, from the Constitution downward, have come into being. It is a method that is far better suited to our national character than the sudden imposition on us of blue-prints and rigid, preconceived ideas. If politicians are wise enough to realize the errors made at the time of the passing of the National Health Services Act and will allow our medical services to develop naturally in this way, they will

gain what hitherto they have lacked, the enthusiastic support of the medical profession.

Epidemiology

The ecologist studies the balance maintained between different forms of life on the earth, and his colleague, the epidemiologist, confines his attention to the balance kept between two of them, mankind and the pathogenic organisms. It will be of interest to discuss the contributions made by the epidemiologist to this important subject of epidemics. One interesting thing we have learnt from him is that epidemics are usually periodic, recurring after the passage of fixed intervals of time. Not that it is possible to establish this periodicity in the case of all epidemic diseases owing to the absence of reliable historical records. Fortunately trustworthy records exist for influenza and a rhythm in its epidemics can be made out. Of this disease it can be said, with a fair degree of confidence, that great epidemics recur at intervals of from twenty to thirty years. Whatever be the explanation of this periodicity—and no satisfactory explanation has yet been given—the fact that it is periodic need not surprise us. Everything in the universe, from the motions of the heavenly bodies down to the movement of electrons, is bound to some rhythm, and it would be strange if this were not also true of happenings within organic life. It is certainly true of the life, of the individual as revealed in the systole and diastole of the heart, the inhaling and exhaling of breath and the alternations of sleep and wakefulness. Because epidemics are phenomena of that great aggregate of living things that we call organic life, it is to be expected that it also is rhythmic in character. It represents a temporary disturbance of the relationship between two of the constituents of organic life.

The periodicity of influenza

A periodicity was long ago noted in the time of the occurrence of widespread infections of the respiratory passages. Both Hippocrates and Sydenham drew attention to this fact that nasal and bronchial troubles were prevalent about the time of the equinoxes, and that they usually reached their maximum just prior to the vernal equinox and just after the autumnal equinox. Modern research on the mortality returns from London also shows that in every year there is a thirty-three-week periodicity in the mortality rates of influenza, the peak being reached somewhere between January and May. Modern statistics therefore lend support to the older generalizations made by Hippocrates and Sydenham.

Yet a third rhythm has been found in the incidence of influenza. In his Chadwick Lecture of 1918, Dr. F. G. Crookshanks stated that a historical survey of catarrhal and nervous forms of influenza during the last 450 years, shows that "there is a tendency for it to appear in epidemic form about every eleven years, and for greater epidemics to recur every thirty-three years"—that is to say, three times in a century. Three rhythms have therefore been described in the case of influenza: (1) a seasonal or prevernal and post-autumnal equinoctial periodicity; (2) an eleven-year epidemic periodicity; and (3) a thirty-three-year periodicity for the reappearance of great epidemics. (F. G. Crookshanks, *Epidemiological Essays*).

What is responsible for these rhythms? In the 1921 Report on Influenza issued by the Ministry of Health we were assured that "the cruder generalizations of the older hypotheses are unsound and that the part played by the meteorological peculiarities of the pandemic years was a minor one." Dr. Crookshanks waves aside the Ministry's assurance on this point.

He refers us to C. M. Richter's painstaking studies of influenza epidemics, and states that this observer established a "correlation between the pandemic periodicity of influenza and cyclic variations in air pressure, so that, broadly speaking, pandemic and epidemic influenza corresponds with general and local high air pressure." Crookshanks agrees with Richter's observation that inter-pandemic and epidemic quiescence corresponds with low air pressure conditions. He then goes on to correlate these pressure findings with solar phenomena, calling attention to the fact that sun-spots attain their maximum every eleven years. When sun-spots are at their peak, the sun is swept by great storms and surface upheavals which produce in turn magnetic disturbances in the earth's atmosphere. He is bold enough to trace a connection between the eleven- and the thirty-three-year periodicities noted in influenza epidemics and pandemics and the eleven-year cycle of solar disturbances. Nor is Crookshanks the only man who has sought to correlate solar cycles and human events. Moreansc, who was formerly astronomer at the Bourges Observatory, declared that there was an obvious connection "between sunspots and individual and national disturbances of health—physical and mental." He believed that the magnetic storms in the earth's atmosphere associated with a maximum of sun-spots had a direct bearing on such catastrophic terrestrials happenings as wars, revolutions and great epidemics. So convinced was he of the connection between solar and human upheavals that he predicted renewed disturbances in 1938. So one small section of scientific thought appears to be turning in a circle and to be resuscitating the ancient idea that epidemics are caused by changes in the earth's atmosphere brought about by the movements of the heavenly bodies! Whether there be truth in these old astrological notions or not, the fact that some epidemiologists are prepared

to consider the possibility of their being an element of truth in them is a reassuring sign that scientists are becoming less intolerant of ancient ideas than they formerly were.

Scientists abstract objects from their surroundings for the purpose of studying them, but by this act of abstraction much of their significance is lost. The universe is not, as we are sometimes tempted to regard it, a number of isolated objects moving about in space, but a great integrated whole in which everything is related to and is dependent on everything else. This is true of all that the universe contains, including human life on this planet, and it is for this reason that such seemingly far-fetched notions as a relationship between epidemics and electrical changes in the earth's atmosphere should not be summarily dismissed as fantastic. In the writer's opinion the Ministry of Health's assertion "that the cruder generalizations of the older hypotheses are unsound" cannot be accepted as a self-evident truth. It is quite possible that there is more in these old ideas than the writer of this official report would have us believe. If Crookshanks' and Richter's observation that epidemics of influenza are associated with certain atmospheric conditions is correct—and it must at present be regarded as being only speculative—there are two possible explanations of this relationship. One is that these changes in the earth's atmosphere lower human resistance to influenza and the other that they increase the virulence of the organisms responsible for influenza.

A medical reader, if any medical colleague of mine should read this book, may well complain that to introduce what are known as "occult" factors into a medical discussion is unscientific, and to be unscientific is the last thing that a writer can afford to be. But why, I ask them, should we doctors reject observations merely on the grounds that they cannot be

explained in terms of current science? Are there not innumerable things that science is unable to explain? In Crookshanks' words, "... even if we are driven, like Hippocrates and like Sydenham, to invoke 'occult' and hidden forces, that will not mean that we are falling back into superstition and darkness." It may well mean "that we are adopting a more truly philosophical and scientific attitude than are those who make glib use of the verbal 'explanations' that pass current to-day, and that obscure, rather than indicate for us, the operations of Nature around us, of which we form a part."

Chapter XIV

PROBLEMS FOR WHICH THE DOCTORS ARE RESPONSIBLE

THE Victorians showed great skill in combining piety with sound business principles and in wedding hard-headed realism with sentiment. They were fond of referring to the profession of medicine as a noble one and of likening the doctor to the priest; as the latter ministered to man's soul, so did the former minister to the needs of his body. Even the cynics in those days dealt kindly with the medical profession, agreeing that if the doctors did but little good, they seldom did any harm. The prevalent view of the medical profession was reflected in the art of the day and Sir Luke Fildes' pictures adorned many homes. The writer of this book cherished the same comforting illusions as did his parents concerning the nobility of the doctors, and when he was informed, during his schooldays, that Plato had excluded them from his ideal republic, he believed him to have been guilty of prejudice. Now he realizes that the author of the *Republic* was perfectly right in banishing them, for they have unwittingly caused a great deal of harm. In solving one kind of problem they have created new ones on a vastly greater scale. Not that they are to be blamed for the public mischief they have thus wrought. They foresaw the remoter consequences of their work as little as did Lord Rutherford foresee those which were to result from his splitting of the atom. Enthusiasts are singularly shortsighted and, taken as a class, doctors are enthusiastic about their work. Some of the major problems for which the

medical profession has unwittingly been responsible will be discussed in this chapter.

The ageing population

No expert knowledge is required in order to appreciate the simple fact that a fall in the death-rate, unbalanced by a corresponding rise in the birth-rate, will inevitably result in an ageing of the population, and this is what has been happening in Great Britain during the last sixty years. In 1891 the under-twenties constituted 45 per cent. of the total population of this country; in 1947 they formed only 28 per cent. of it. Between these same two years, 1891 and 1947, the percentage of the over-sixties doubled itself, rising from 7 per cent. to 15 per cent. The expectation of life now stands as high as sixty-eight, and it is likely to continue to rise for many years to come. From the point of view of the middle-aged man and woman, this is a very satisfactory state of affairs, but when looked at from the broader standpoint of the nation it is seen to be fraught with economic danger. As people age they become less and less capable of doing work, and eventually there comes a time when they cease to be self-supporting and become dependent on others. So far, the younger members of the community are just managing to support their elderly relatives, but as these younger workers become fewer and the old still more numerous, their burden will become intolerable to them. What is happening in Great Britain is also happening elsewhere. In all the more highly civilized countries of the world the population is becoming older. In the United States the age-group between forty-five and sixty-four and from sixty-four upwards has more than doubled itself during the last hundred years, despite the fact that America receives every year an invigorating influx of young and middle-aged immigrants from Europe. The

ageing of the population is now a widespread trouble for which the progress made by medicine during the last 100 years is responsible. Nature is ruthless and she maintains the vigour of the species by killing off the aged and the unfit. By rebelling against her laws and working only too successfully in the opposite direction, the doctors have created an insoluble problem. Only palliative measures are now possible, and the most obvious of these is that the old should continue to work as long as they can. Physiological age does not necessarily tally with chronological age, and there is many a hale and hearty septuagenarian who is quite capable of working for his living. To enforce the retirement of everybody at the chronological age of sixty or sixty-five is an entirely uneconomic measure. But if the old are to be allowed to remain at work, they must be willing to make way for the promotion of their more efficient juniors by accepting positions of less responsibility than those which they formerly held. This may be a difficult condition for the elderly to accept, but they should regard it as payment for their enjoyment of a longer lease of life. It will be for the doctors to do everything within their power to maintain and to improve the health of the elderly workers.

But the ageing of the population is only a small part of a much greater and far more serious problem now about to be considered.

World population and food supply

A hundred and fifty years ago Malthus wrote his *Essay on Population* and called attention to the relationship which existed between the rise in the population and the available supply of food. He stated that human beings multiplied by geometrical progression, whilst agriculture increased only by arithmetical

progression. This being so, humanity was in danger of overrunning its food supply. The Victorian world was shocked that a clergyman should make statements from which only one moral could be drawn—namely, that it was necessary to control the birth-rate, and Malthus was severely taken to task for writing such an immoral book. His critics declared that not only were his conclusions irreligious, but that they were also incorrect. They pointed out that there were large areas of the earth which could be brought into cultivation, so that as much food could be grown as was required. They said that the resources of agriculture were almost unlimited and that a balance could always be maintained between man's rate of increase and the rate of increase of his food supply. And at the moment at which these criticisms of the Malthusian doctrine were made they were valid. In the earlier part of the last century there existed immense reserves of uncultivated virgin soil, particularly in North America, vast tracts of land which could at any moment be brought under the plough. Sir Charles Darwin refers to the Victorian era as one of the Golden Ages of mankind, but it was a strictly localized Golden Age. Western Europe, and particularly Great Britain, had never been so prosperous as it was then, and thanks to the action of disease and periodic famine, the increase of population elsewhere, such as in Asia, was being held in check. At that time, America, Africa and Australia were sparsely populated. All was right with the world therefore in the eyes of those living in a country enjoying immense profits from rapidly developing industry. Malthus was dismissed as both a crank and a scare-monger.

His main principle was right, and his second—namely, that men were in danger of overrunning their food supply—was also right, but obscured by the exceptional conditions which

reigned at that time. Almost a century had to pass before men were able to realize the correctness of the second Malthusian principle. Thanks to the progress of medicine, and particularly of public health and of preventive medicine, the increase in world population is now so great that the situation has become obvious to everybody, except the deliberately blind. Humanity is in imminent danger of overrunning its food supply. In writing on this subject, Sir Charles Darwin estimates that a population is capable of doubling itself in a century: "If the population is doubled in a century, it is only three and a half centuries before it will be ten times its present number, and this will exhaust what I have estimated as the possibilities of the existing system of agriculture. Keeping on the same natural rate of increase, the population will have increased a thousandfold in ten centuries and even if new agricultural methods should permit the production of a thousand times as much food as at present, there would by then still only be just enough food to support the population. And a thousand years is a short period even in the span of known past history" (Sir Charles Darwin, *The Next Million Years*).

Sir Charles Darwin has underestimated the rate at which populations double themselves in stating that this occurs every hundred years. Sir John Megan is of the opinion "that any large community living in favourable environmental conditions doubles and redoubles itself every twenty-five years or so, unless the members of the community impose some check on the natural birth-rate." (Sir J. Megan. *Over-Population as a World Problem*.) Even when the environmental conditions are not very favourable, owing to shortages of food, the rate of increase is not materially reduced, for the new-born babies of poorly-nourished mothers are surprisingly healthy. Unfortunately the embryo has the capacity to extract nourishment

from the mother until she has been reduced to a deplorable state of malnutrition. Moreover malnutrition has no marked effect on fertility. India has always suffered from periodic famines and even the more prosperous families in that country are often under-nourished, yet during the years 1921-1941 she added eighty-three millions to her teeming population.

Actually there has never been, and there never can be, more people in the world than there is food for, since starvation begins its thinning process before this point is reached. This is a biological law which will hold good in the future as it has held good in the past. There has always been and always will be a prosperous majority possessed of food and an under-nourished minority struggling to obtain it. Nature's method of maintaining a balance between her various forms of life is first to create a surplus of them and then to remove that surplus by means of starvation and disease. If we want to escape from the unpleasantness of being thinned out in this painful way and prefer that our children should not have to struggle with their neighbours for food, we must contrive that Nature is not provided with her usual superabundance of life. Actually we have done the exact reverse of this and have produced a lavish excess for her to eliminate. By combating disease, by preventive medicine, by an enormous reduction of infant mortality, by raising the average duration of life, by ensuring the survival of the unfit, and in a dozen other ways we have played into Nature's hands. The population of the world is now increasing so rapidly that former methods of holding it in check, such as warfare, are no longer sufficient to have any effect on it. War on a world-wide scale, with a liberal supply of atom-bombs, would do little to remove the surplus that has been, and is still being, produced. Since we have impaired the efficacy of one of Nature's methods of getting rid of a

super-abundance of life—namely, unfitness and disease—she will have to fall back on her other means of doing so. Starvation will be necessary on a much larger scale than before, and at no very distant date.

Hitherto, emigration from densely populated to sparsely populated countries has been our European method of getting rid of an excess of inhabitants, and for two centuries Europe has been pouring her emigrants into America, Asia, Africa and Australia. These emigrants have taken with them Western knowledge and machinery and have helped to develop backward countries. Swamps have been drained, roads made, railways built, more efficient methods of agriculture started, hospitals erected and preventive medicine introduced. Thanks to the last-named, the incidence of disease in these new lands has been reduced, the high infant mortality rate has been lowered, and as a result of all this the native population has rapidly increased. Then follows the usual sequence of events. Having learnt Western methods of living and at the same time acquired a taste for democracy, the indigenous population has become restive and clamoured for its independence. Eventually this is won and the European rulers and their medical experts then depart, leaving the new native governments to deal with their over-population problems. This has been the sequence of events in India and Indonesia and it will happen later in our great African dependencies.

Population control

The most obvious beginning to any attack on this population problem is that advised by Malthus, the institution of birth control, and, since the problem has now assumed world-wide dimensions, birth control on a world-wide scale. By suitable propaganda, every nation must be taught the need to relate

its increase to its available food supply. This appears to be the only means by which the actualization of the threat of world-starvation can be postponed, even if it cannot be eliminated. Steps are already being taken to work along these lines, and an American unofficial body, the International Planned Parenthood Committee, is doing what it can to instruct the less advanced nations of the world in modern contraceptive technique. Its efforts are to be encouraged, but unfortunately the campaign has been launched too late to be anything other than palliative. The torrent of procreation amongst the more primitive and the less educated peoples of the world is in full spate, and birth control propaganda can do little to arrest it. Too little is being done too late.

Racial deterioration

Unfortunately, the remedy which we are applying to alleviate this glut of humanity is far from being a harmless one. Whereas Nature's cure for over population, the struggle for survival, eliminates the unfit, ours gets rid of the fit. It does so because it is only the more able and responsible members of the community that use contraception for the purpose of limiting the size of their families, whilst the less responsible members continue to increase without let or hindrance. So much is this the case that the extent to which birth control is being practised can be used as an index of the level of living. The better the education of, and the greater the prosperity of, the community, the more does it practise birth control; the less educated and responsible it is, the less is birth control in evidence. Contraception can therefore be regarded as the means by which a society sterilizes its best elements and ensures the fertility of its worst; in other words, it is modern man's method of committing racial suicide. By advocating

birth control we are compelled to encourage a reduction not only in quantity, but also in quality.

The future of Asia and Africa

Europe is a small continent and it has been suggested that her population problem might be solved by the overflowing of her superfluous inhabitants into the great adjoining continents of Asia and Africa, but this is the last thing that is likely to happen. If there is to be a wave of emigration in the future, it will be a wave moving in the opposite direction, from east to west. Large though Asia be, it is already the home of 53 per cent. of the world's total population, and unfortunately only a small part of it is under cultivation. By further efforts, it may be possible to render another 20 per cent. food-producing, but it can never become a dump for Europe's superfluous people. Recurrent famines have long been accepted in China and India as natural and therefore as inevitable events; and even with the introduction of more efficient methods of agriculture the food supply is still likely to remain inadequate for local needs. The population of these countries is increasing at such a terrifying rate that it is in Asia that the problem of world shortage of food is first likely to come to a head. And when the inhabitants of one country are dying of starvation and realize that those of a neighbouring land still possess food, it is easy to foretell what will happen. Preferring a possible death by violence to a certain death by hunger, the starving masses swarm into their neighbour's territory. What has been true of countries in the past is also likely to prove true of continents in the future, and, this being so, Europe runs a greater risk of being invaded in the future by Asiatics than Asia by Europeans.

Fifty years ago Africa was sparsely populated, and even now

it contains only 7.5 per cent. to the total population of the world. What has happened in Asia is now beginning to happen also in Africa. Through the action of preventive medicine, its population is on the increase, and as only 10 per cent. of that continent is reported to be suitable for cultivation, it will overtake its food supply at no very distant date. Political history will be repeated there. The African is just as capable of managing and of mismanaging his own affairs as the European, and having been given a Western education and taught the game of politics, the Negro will naturally demand his independence. To imagine that he will be willing to be dominated by a European minority and remain a subservient race is as ridiculous as to imagine that either Asia or Africa will supply Europe with food. The game of the chosen race is one that other races are able to play.

The fallacy attached to prophecy

As has been pointed out, all prophecy based only on a study of present trends suffers from the weakness that it does not and cannot take into account unforeseen factors that are capable of altering the whole course of future events, such as prolonged atomic warfare on a world-wide scale or the synthesis of food by the chemists. Unlike the inspired prophet, the scientific one works by extending the present into the future and exclaiming: "Thus will things be." But the future will bring into play factors that do not at present exist, and it will not be, what we are imagining it will be, present trends raised to the *n*th degree. The reader would therefore be ill advised to take the above prophetic utterances too much to heart. The author's sole reason for leaving the field of medicine and discussing these great world issues is that the future of medicine necessarily depends on the future of mankind. If Western civilization

survives, the medical arts are likely to continue to follow their present course and if, on the other hand, it comes to an end, then it is obvious that the future of medicine will be utterly different. There is yet another excuse for discussing these great world questions. It is that in the event of Western culture managing to survive, medical men will undoubtedly be called upon to take a much greater part in State decisions and in State efforts to deal with these great problems than they have done in the past. Scientific commissions and advisory councils are already more in evidence than they were forty years ago and the disposition of politicians to call in the help of medical experts will undoubtedly grow. Medical advisory boards are going to play an ever-increasing part in government action, and it is likely that in course of time the private practitioner will be completely transformed into a government official. This is a scientific and spiritually barren age, and debatable questions will be settled in the future on entirely scientific grounds. When a conflict exists between the interests of the individual and those of the State, it is the latter that will always prevail. Because the medical profession is going to be drawn more and more into the State machinery and be called upon to suggest remedies for such problems as the excess of the population over the available food supply and the deterioration in the quality of the race, the means by which these evils may perhaps be remedied will have to be considered.

The reduction of the birth-rate

Great though the improvements have been in the technique of birth control, it is still true that a modicum of intelligence is demanded of those who make use of it. Another obstacle to the widespread use of contraception is that the cost of the materials required puts it beyond the reach of those whose

economic resources are barely sufficient for living. What is needed if birth control is to become a practicable proposition to those who at present do not use it is a cheap, reliable method which can be carried out with a minimum of intelligence and at negligible cost. Up to the present such a method has not been found, but there is a prospect of it becoming available at no very distant date. A great deal of work is at present being done on this subject, and one of the most promising line of research is the following. A certain tribe of Red Indians is said to have used a certain plant as a means of contraception, and extracts of this plant are now being investigated. Animal experiments have shown that the extracts act by inhibiting ovulation. By taking this plant, the Indian women rendered themselves sterile, and what has now to be found out is whether this sterility was permanent or not, and whether the method is innocuous to health. In the meantime, much work is being carried out on animals, and it has been found that when hesperidin is given by mouth to thirty female rats it prevents pregnancy in 80 per cent. of them. Even should the above-mentioned extracts of Indian origin prove unsatisfactory, there is little doubt that eventually a reliable oral contraceptive will be found, a discovery that will be of far greater value to mankind than the discovery of a method of manufacturing hydrogen bombs. The next and more difficult step will be for the nations to reach a world-wide agreement on the subject of population control. This will be no easy matter in a world which settles its differences by appeals to arms, for no nation is likely to be willing to set a limit to its man-power whilst the risk of war is as great as it is at the present moment.

But let us suppose that the leaders of the nations eventually realize the dangerous predicament of humanity and manage to come to some agreement on this vexed question of man-power. In this case, the third step will be the launching of a world-wide

propaganda campaign. Persuasion alone will be insufficient to ensure that the simple method of contraception which has by that time been discovered is put into general use, and some sort of penalty will have to be imposed on defaulters. Fortunately, the progenerative urge is far less strong than is the sexual urge and the resistance from the section of the community which does not at present employ contraception is not likely to be a very fierce one. Such people as these breed not because they want large families, but because they do not know how to avoid them. That this is so is supported by the fact that the International Planned Parenthood Committee has as yet encountered only a minimum of opposition on the part of the peasantry of India against its campaign. Whenever there has been antagonism it has come mainly from religious bodies, such as the Catholic Church, which, in spite of its realization of the imminent danger of world food shortage, still maintains an uncompromising attitude to the limitation of families. When such a limitation becomes a compulsory measure, as eventually it must, it can be anticipated that the usual small minority that rebels against all innovations on conscientious grounds will lodge its customary protest, but that its opposition will only be a short-lived one.

Personal bias of the author

In writing of the more distant future, the author is aware of a conflict between his heart and his head. Intellectually he is unable to see any security for men unless they can contrive to band together into larger and larger groups, the ultimate aim being the amalgamation of these groups into a single world community. This goal would be a noble one if world union of this kind meant a general acceptance of the truth that all men are brothers. But the union of the nations under a single world

government is not likely to be brought about in this way, or to be any indication of man's spiritual progress. It is more likely to be enforced on mankind through economic and political pressure. In other words humanity will be compelled by sheer force of circumstances to organize itself into larger and larger groups which are held together by an ever-increasing number of laws and by the ability of governments to command obedience to these laws. This means that the State will become all-powerful. It will not exist in order to protect and to serve the interests of the individual, but the individual will exist to serve the interests and requirements of the State. Everything at present would appear to indicate that humanity is already moving slowly in this direction of the ant-heap, and in no ant-heap can there be found such entities as individuals.

Now if there is anything of which I am convinced it is that a society is on a lower level of being than the individual men and women of which it is composed. It is a common error to imagine that because an organism is superior to the cells of which it is made up, a great community of men is on a higher level than an individual man. This is quite untrue, for the analogy of a nation with an organism is an entirely false one. A nation is not an integrated whole, but is only a chance conglomeration of men and women. It is only the individual who is capable of creating and of rising in the sphere of being; not the masses, nor the government, nor the nation in general.

Long before the world ant-heap of the future has taken shape, long before all individualism has disappeared, the doctor will have become a State official wielding immense power over his fellow men. Amongst his duties will be that of deciding who amongst the applicants for parenthood can be granted the privilege of reproduction. As a State official, he will have to ask himself many questions: "Is this applicant endowed

with the genetic qualities the Government requires or is it better that he should remain childless?" Because sex-determination by that time will have become a practical proposition, the sex of the requested child will also have to be taken into consideration before a permit is granted. "What," the doctor will have to ask himself, "is the present balance between the sexes? Has the nationality to which the applicant belongs already been granted its full quota of children? Is the genetic history of the applicant's partner entirely satisfactory? Will more labour be required for some large Government work in twenty years' time, when the child will have reached maturity, for some such enterprise as the projected Sahara Irrigation Scheme? Or has labour for that already been allowed for? Is the age-limit in the new Euthanasia Bill likely to be altered by the World Assembly next autumn and if so will it be raised or lowered, for this is bound to alter the birthrate permitted for that year?" Before a reproduction permit is granted, a great many questions will have to be asked of applicants and many investigations will have to be made in the statistical branch of the Population Ministry and of other Government offices. If the Government official of the future resembles the Government official of the present day, many would-be parents will be discouraged by the delay and, in the end, decide to remain what they were before—childless.

The prevention of racial degeneration

The logical method of combating racial degeneration is by selective breeding, and it is possible that eugenics, that neglected science of human breeding, will eventually be put into practice. Sir Francis Galton, the founder of the eugenic movement, defined its object as an effort "to bring as many influences as can reasonably be employed to cause the useful classes in the

community to contribute *more* than their proportion to the next generation." In other words, the aim of eugenics is to reverse the process of breeding from inferior stock, and no one can deny that this is highly desirable. There is, however, the initial difficulty of deciding which are the "useful classes." Galton himself described them as the classes which possess excellent health, energy, ability, manliness and aptitude for the various professions and occupations. He wrote that "Everything in the scientific breeding of the human race was to be much as in the breeding of animals." He was careful to add that, "as morality involved so many difficulties," it would be better to omit consideration of the moral qualities. As a scientist, he was probably right in excluding them for morality is an acquired quality and, according to present scientific views, it is not transmitted from the parents to their offspring. Morality undoubtedly presents difficulties to the planners of the brave new world to come, and it is likely that they will follow Galton's advice and cease to consider it. Breeding will be entirely along scientific lines, as it is in the stockyard.

Galton recommended this and stated quite clearly that eugenic principles should be applied to human breeding "much as in the breeding of animals." But the two cases are by no means parallel, for the breeder of animals has a clear idea of his aim, whereas the eugenicist has not. In breeding cows the aim of the breeder is to produce the maximum of milk or beef; in hens the largest possible output of eggs; in sheep, the best wool or mutton. But what sort of man does the eugenicist hope to produce? The superman, perhaps. But what are the superman's characteristics? All novelists come to grief when they attempt to describe him. Hilton gives us an account in his otherwise excellent novel, *Lost Horizon*, of the superior beings inhabiting the Tibetan monastery to which the aeroplane brought his travellers, but

all that he could find to say about them was that they lived to an immense age and were both cultured and courteous. It is true that J. B. S. Haldane has been much more explicit, but like many other enthusiasts Haldane weakens his case by promising too much. He writes that if eugenic principles are put into practice, a million years hence "the average man and woman will realize all the possibilities that human life has at present shown. He will be able to think like Newton, to write like Racine, to paint like Van Eyck, to compose like Bach. He will be as incapable of hatred as St. Francis, and when death comes at the end of a life, probably measured in thousands of years, he will meet it with as little fear as Captain Oates or Arnold von Winkelreid" (J. B. S. Haldane, *The Inequality of Man*). It is difficult to see how the controllers of a vast experiment in human breeding can succeed in blending the diverse qualities mentioned in Haldane's list. When the cattle expert breeds either for milk or beef, he does not expect to obtain both. Nor does the breeder of sheep hope for the best mutton and wool. To obtain one quality in a superlative degree, another quality has to be sacrificed. This surely applies also to human breeding. The genius usually compensates for his special gifts by displaying certain weaknesses in dealing with the ordinary affairs of life. When great development is obtained in one direction it is always associated with underdevelopment in another, as the dairy farmer is now finding. The output of milk has been trebled in certain breeds of cows, but at the cost of their fertility and of their increased liability to mastitis. Everything has to be paid for at the expense of something else, and I find it difficult to believe that in eugenics an exception will be found to this rule.

But there is a negative as well as a positive form of eugenics to which these remarks do not apply. Whilst we may well

hesitate to breed special qualities in human beings, we have every right to protect the coming generation, so far as this is possible, from inborn defects. This negative side of eugenics was an important part of Galton's original plan, and towards the end of his life he wrote of it as follows: "Its [eugenics'] first object is to check the birth-rate of the unfit, instead of allowing them to come into being, though doomed in large numbers to perish prematurely." Our knowledge of genetics is sufficient now to allow of our reducing the incidence of hereditary diseases—for example, epilepsy, feeble-mindedness and deafmutism. Much useful field-work has been done in the United States and elsewhere on this subject, and the knowledge gained from it should now be put into practice. We can no longer afford to breed from the lowest examples of the human race.

Conclusion

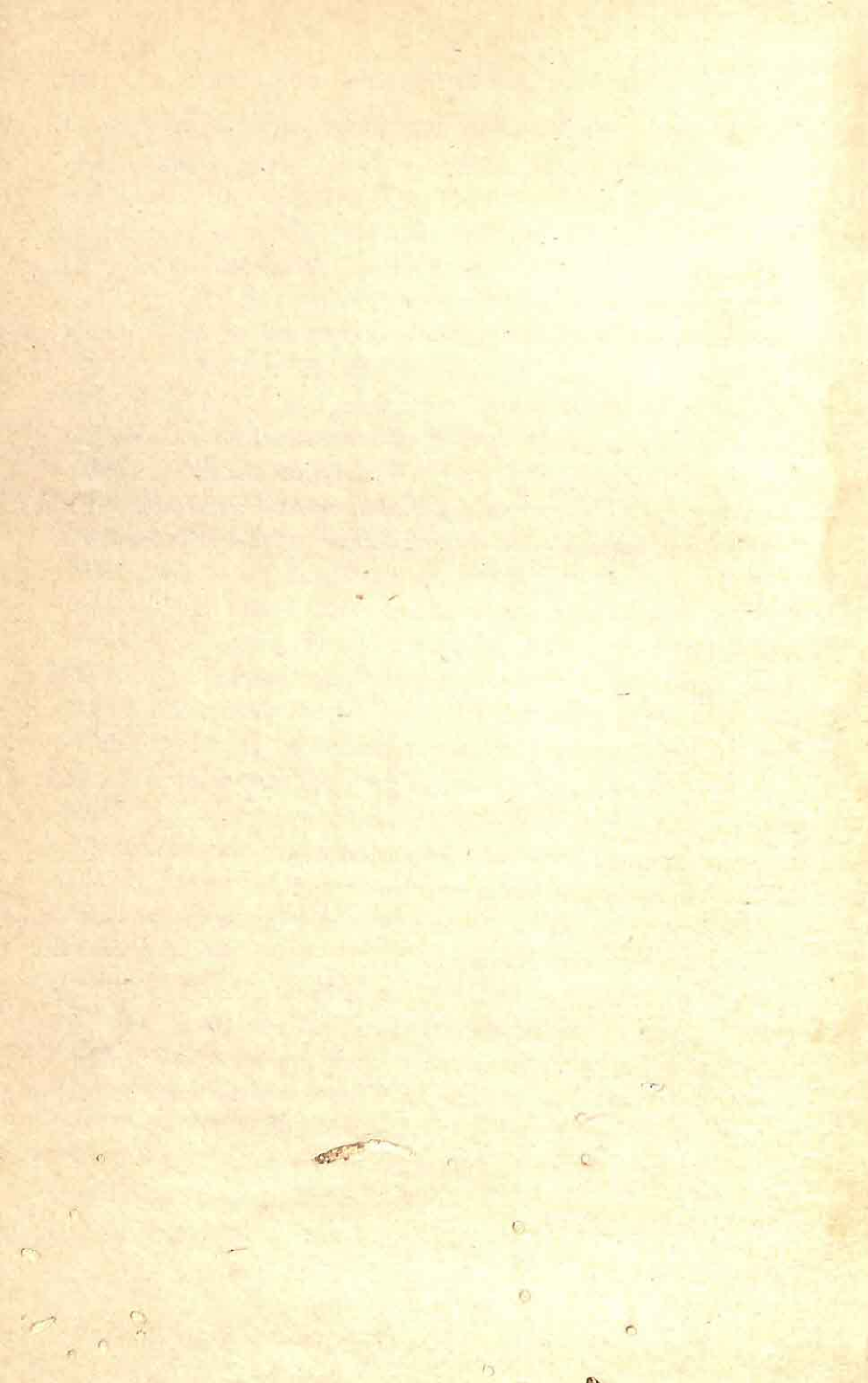
The time has now come for summarizing some of the main conclusions to be drawn from this survey of present trends in medicine. There is every reason to believe that, in the absence of any world-wide disaster, such as war, great advances will be made during the next 100 years in all branches of the healing art. Because men usually die before their time of the illnesses to which old age is prone and not of senescence itself, it is likely that the span of human life will be further extended, so that the great problem with which mankind is faced—how to avoid over-running its food-supply—will become still more difficult to solve.

In the author's opinion, the fact that medicine is likely to make spectacular advances does not mean that Pasteur's dream of a world freed of all disease will be realized. As one form of pathogenic organism is eliminated, it is likely that new forms will appear. But, as has already been pointed out, pathogenic

organisms are by no means the sole cause of illness. Man is possessed of an innate faculty for destroying himself. He talks arrogantly of conquering Nature, but he forgets that he himself is a part of Nature and that so far he has made very little effort to overcome Nature in himself. It is time that he realized that his enemy lies within as well as outside himself. It is unlikely therefore that illness will ever be banished from the earth, and doubtful even whether its incidence will ever be materially reduced. All that will probably happen is that the medical problems of the future will be of a different nature from the medical problems with which we have to deal to-day.

Attention has been repeatedly called to the need for some synthesis of the immense amount of medical knowledge which has been accumulating during the last 100 years and which has by now become so vast that no single individual is capable of taking stock of it. It is to be hoped that this great mass of knowledge will eventually be put into some sort of order and that certain general principles will be derived from its study. So also is it to be hoped that a more synoptic view will be taken of the patient, so that he is seen and is treated as a man and not as a collection of organs. He is an inseparable whole, a unity of body, mind and spirit, and he must be handled as such. Not that the doctors are to be held responsible for this modern neglect of the higher attributes of man. The doctor's failure to treat him as a spiritual being is symptomatic of an age which has so exalted science that it equates truth with scientific truth and has little confidence in philosophy and religion. It is an age which seeks salvation in greater and greater organization, and which moves blindly in the direction of the castrated cleverness of the ant-heap. It is against this background that I have reviewed the future of medicine and the medical profession.

Having visualized the goal towards which humanity is moving, it was easy to infer what effect this movement would have on the future of medicine. But I may well have been wrong in assuming that this drift towards the life of the insect will continue, for the behaviour of humanity is notoriously erratic and unpredictable. Fortunately it never maintains for very long its original direction. Action is followed by reaction; tyranny ends in rebellion, and rebellion in turn imposes on the rebels a new form of tyranny. It may well be that men will never succeed in freeing themselves from their individualism and in reaching the goal they at present seek. And there is yet another and still greater excuse for taking a more optimistic view of man's future than I have done in this book. Life on this planet is only a small incident in a vast field of interrelated cosmic events. We see and understand so little of the great drama in which we are playing our tiny parts that it would be a mistake to regard the study of present events on a tiny planet as a firm basis for prophecy. "There's a divinity that shapes our ends, rough-hew them how we will." Let us put our trust therefore in that divinity's shaping rather than on our own rough-hewing



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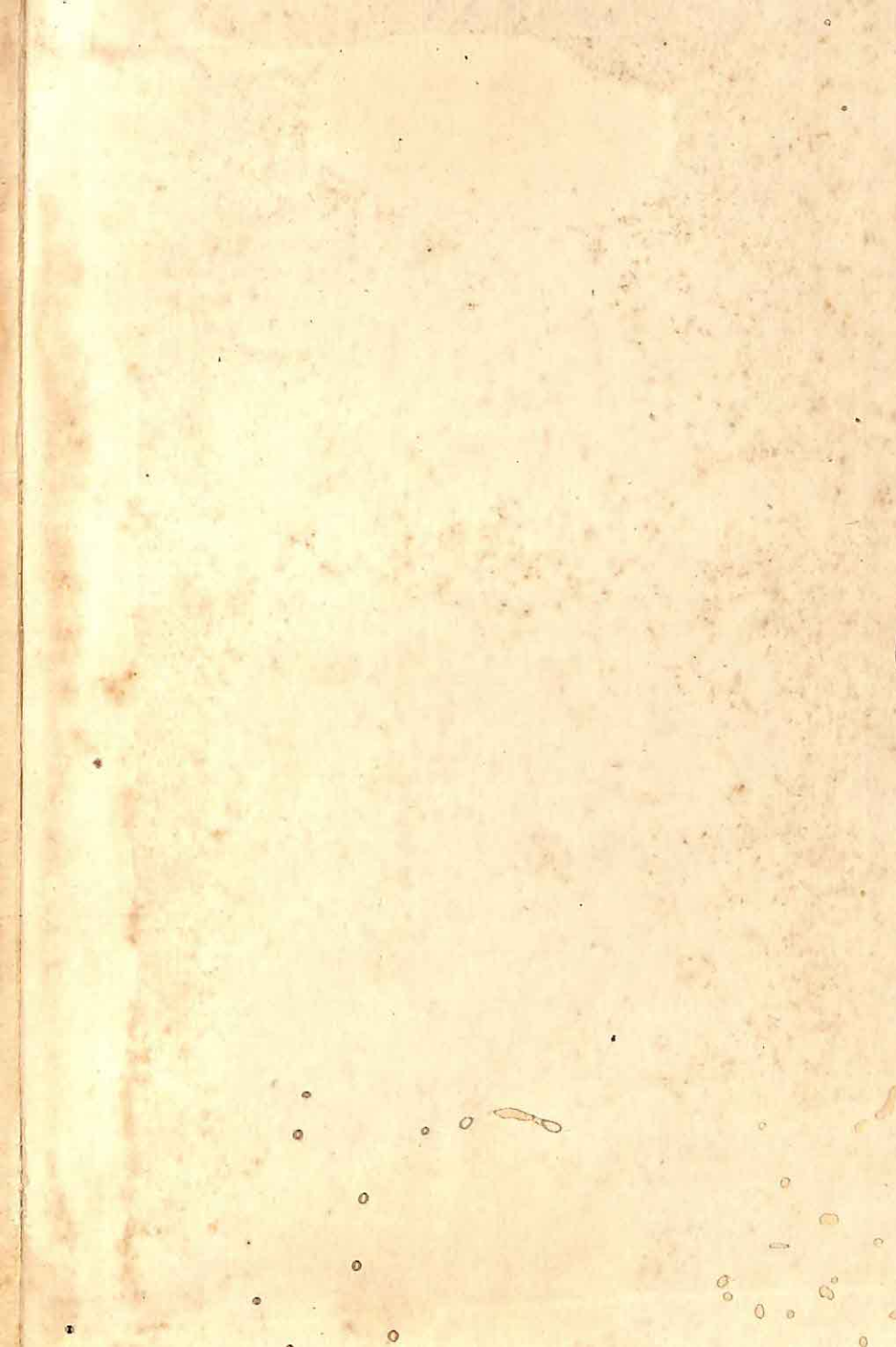
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